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# Proceedings of the Maritimes Regional Advisory Process of LFA 34 Lobster

**1-2 February 2006**

**Rodd's Grand Hotel**
**Yarmouth, Nova Scotia**

**René Lavoie, (Chair)**

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**January 2007**

# Compte rendu du Processus consultatif régional des Maritimes concernant le homard de l'APH 34

**1-2 février 2006**

**Rodd's Grand Hotel**
**Yarmouth, Nouvelle-Ecosse**

**René Lavoie, (Président)**

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**janvier 2007**

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## Foreword

The purpose of these proceedings is to archive the activities and discussions of the meeting, including research recommendations, uncertainties, and to provide a place to formally archive official minority opinions. As such, interpretations and opinions presented in this report may be factually incorrect or miss-leading, but are included to record as faithfully as possible what transpired at the meeting. No statements are to be taken as reflecting the consensus of the meeting unless they are clearly identified as such. Moreover, additional information and further review may result in a change of decision where tentative agreement had been reached.

## Avant-propos

Le présent compte rendu fait état des activités et des discussions qui ont eu lieu à la réunion, notamment en ce qui concerne les recommandations de recherche et les incertitudes; il sert aussi à consigner en bonne et due forme les opinions minoritaires officielles. Les interprétations et opinions qui y sont présentées peuvent être incorrectes sur le plan des faits ou trompeuses, mais elles sont intégrées au document pour que celui-ci reflète le plus fidèlement possible ce qui s'est dit à la réunion. Aucune déclaration ne doit être considérée comme une expression du consensus des participants, sauf s'il est clairement indiqué qu'elle l'est effectivement. En outre, des renseignements supplémentaires et un plus ample examen peuvent avoir pour effet de modifier une décision qui avait fait l'objet d'un accord préliminaire.

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## ABSTRACT

These proceedings record discussions that were held during the Regional Advisory Process (RAP) meetings for Lobster Fishing Area 34 (LFA 34) lobster stock in Maritimes Region on February 1-2, 2006.The scientific peer review of an assessment of LFA 34 lobster stock of was conducted. The discussions from this meeting are presented in this document. The Minutes of DFO/industry meetings to the assessment are in Appendix 7. As requested at the meeting, Draft Indicator Tables appear in Appendix 8. The text of an article for the DFO magazine "Oceans" appears in Appendix 9.



## RÉSUMÉ

Le présent compte rendu relate les discussions tenues pendant les réunions du Processus consultatif régional (PCR) portant sur le stock de homard de l'aire de pêche au homard 34, dans la Région des Maritimes, les 1 et 2 février 2006. Lors de ces réunions, on a procédé à un examen scientifique par les pairs d'une évaluation de l'état des stocks de homard dans l'aire de pêche 34; les discussions auxquelles cet examen a donné lieu sont présentées ici. Les minutes des réunions préparatoires à l'évaluation entre le MPO et l'industrie apparaissent en appendice 7. Tel que demandé lors de la réunion, le brouillon des tableaux pour indicateurs se trouve en appendice 8. On reproduit en appendice 9 le texte d'un article pour le journal « Océans » du MPO.

## INTRODUCTION

The meetings were held at the Rodd's Grand Hotel, in Yarmouth, 1-2 February 2006. The Invitation letter and list of Invitees are in Appendix 1 and 2. The Chairman, René Lavoie, welcomed the participants (Appendix 3), outlined the procedure for the meeting, the specific role of scientific referees, industry representatives and observers, and reviewed the agenda (Appendix 4).

The Chairman also explained that the objective of the meeting was to conduct a thorough peer review of the stock assessments presented by the DFO science team with input from representatives of the industry and from the province of Nova Scotia. He also clarified that the RAP was NOT the place to discuss management considerations. Management considerations are discussed at Advisory Committee meetings. The Remit for this meeting is in Appendix 5.

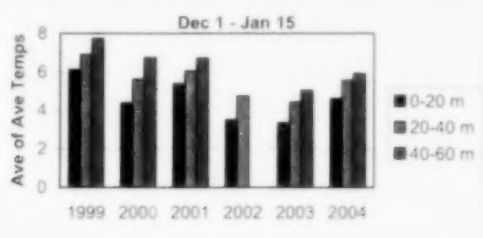
In these proceedings, summaries of presentations have either been provided by the authors or have been reviewed by them. Comments from referees have been provided by them and have been reproduced with little or no editing.

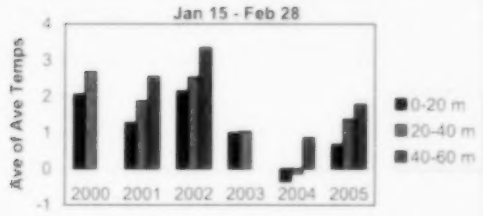
## SUMMARY OF PRESENTATIONS

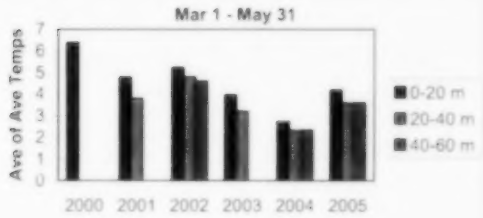
### Information papers

***Ocean Temperature in LFA34* (Brian Petrie)**

The presentation consisted of 3 parts: a review of the physical oceanography of the region, an analysis of temperature data from the FSRS deployments in LFA34 and an examination of some longer temperature time series that go back to 1950. Temperature data collected through the FSRS were averaged into 3 depth intervals (0-20, 20-40, 40-60 m) for the fall (Dec 1-Jan 15), winter (Jan 15-Feb 28) and spring (Mar 1-May 31). Mean temperatures decreased for all seasons and depth intervals by about 2.5°C from 1999-2000 to 2003-04, followed by an increase of about 1°C in 2004-05.




**Methodology (Doug Pezzack)**

The LFA 34 fishery is the largest lobster fishery in Canada, accounting for 40% of Canada's lobster landings and 23% of worlds *Homarus sp.* landings

Lobsters are distributed from Northern Newfoundland to the outer shelf off the Carolina, and over most of their range lobsters are a coastal species inhabiting a narrow band along the coast. However in the Gulf of Maine region the oceanographic conditions result in warm deepwater that remains between 6-9C year-round resulting in a wider habitat for lobsters to exist. Lobsters are found from the intertidal areas to the upper slope of the continental shelf and in the beep basis of the Gulf of Maine. This results in a very different fishery which is more mobile and targeting a wider area.

Following the FRCC Report on Lobsters in 1995, there were a number of management changes in the fishery

| | |
|---|---|
| 1998-99 | Logs recording landings, effort & location (by 10 minute grids) |
| 1998-99 | Voluntary v-notching |
| 2000 | Minimum size increase from 81mm to 82.5mm CL |
| 2001 | Industry Conservation Harvesting Plan |
| | Required to release one & no clawed females |

The objectives of the 2006 LFA 34 FAP are to:

Evaluate 2004 stock status of lobster stocks in LFA 34
Recommend indicators for monitoring the future health of lobster stock.

The 2006 assessment used indicators for the first time in LFA 34. Indicators are chosen to summarize large amounts of information into a few relevant signals that can be used to monitor the state of the lobster population and the fishery. These indicators often used information which is easily measured and thus reflect what fishermen may be seeing in there catch. Indictors were scored as + (improved in 3 of the last 5 years relative to 1998-2000 period); -- (showed a negative impact in 3 of the last 5 years relative to 1998-2000 period); and 0 if no change.

The general groups of indicators chose are:

Abundance (How much is there?)
Fishing Pressure (How much is being removed?)
Production / Recruitment (How much is being produced?)
Ecosystem / Environment (What is happening in the ocean that may affect these?)

The data sources used are:

- Landings 1890-1998
- Logbook landings with effort & location 1998-2005
- At sea samples of commercial catch 1978-2005
- FSRS Recruitment Traps 1998-2005
- Scallop Survey 1991-2005

A major data source was the LFA 34 logbooks in which daily catch, effort (trap hauls) and location (by 10x10 min grids) are recorded. To use this data the records were examined and invalid records were removed to give a data set which had catch effort and location for each record. Records were removed that had:

- No catch
- No effort
- No or invalid Grid
- Obvious data entry errors
- Values outside of reasonable range

The data set used accounted for an average of over 85% of the records, and landings and over 92% of the total trap hauls.

For the analysis the fishing season was divided into three major periods:

**Fall Season** start to Dec 31 (sometimes further divided into the first 2 weeks and the remainder of December)
**Winter** January 1 to March 31
**Spring** April 1 to May 31

## SUMMARY OF THE WORKING DOCUMENT

### Abundance Indicators

Landing levels are a function of abundance but they are not an exact reflection of abundance. It is important to remember that landings can be affected by several other factors, namely fishing effort (trap hauls, soak days, timing of effort and fishing strategy), catchability (environmental, gear efficiency, density, and migrations), and the distribution of animals.

Landings are currently high in LFA 34. They are higher than the historical mean of the last 10, 25 and 50 years. The pattern of landings in LFA 34 similar to otherparts of the Gulf of Maine. A comparison with other geographical areas shows that areas outside the Gulf of Maine increased at same time as LFA 34 but peaked in the 1990s. Landings from the Southern New England have collapsed in recent years

Landings by fishing period (Fall, Winter and Spring) were examined for the period 1998-2004. Fall landings increased to a peak in 2001 and have decreased every year since. Spring landings increased slightly and Winter landings were stable throughout the period.

Landings by Grid Group were examined over the same time period. The largest increases were in grid 4A (German Bank) while the largest decreases were in grid 2A (lobster Bay). Overall, near-shore landings declined from 85% of total landings in 1998 to only 65% of landings in 2004.

### Catch Rate Analysis ( John Tremblay )

The catch rate analysis is based on fishermen logbooks, FSRS recruitment traps, and data on lobster by-catch in the DFO scallop survey

Catches in traps are used to develop an indicator of annual changes in catch-per-unit-effort (CPUE). The CPUE is assumed to reflect abundance. CPUE index variations are related to the areas fished (grid groups), days within the season, and fishermen's fishing strategies.

A statistical model is developed to account for variation that is not related to population size.

Data Sources

There are two principal sources of data:

- Commercial logbooks (lb per trap haul). There are large numbers of logs, and they are completed by fishermen on a daily basis.
- FSRS logs (number per trap haul of different sizes/sex). These logs offer more standard and high resolution data, but fewer fishermen are involved.

Data Preparation

In preparation for treatment, logbooks were examined to remove data with no effort or location information, group data into 9 "grid groups" (1, 2a, 2b, 3, 4a, 4b, 5, 6, 7), divide each data set into Fall (start-Dec. 31), Winter (Jan. 1-Mar. 31) and Spring, and remove licenses with fewer than 5 records within the year for any Fall, Winter or Spring period.

This resulted in the retention of 77% of the records contained in the original raw database.

Interpretation

Most fishermen following the same trend within the first 30 days of the season.

It is recognized that fishermen differ in overall catch rates. The model assumes that fishermen who have above average catches in one year tend to do so in other years; the same applies for fishermen who have below average catches

Conclusions – Fall Fishery

Compared to the 1998-99 & 1999-2000 reference periods, the mean CPUE from mandatory logs was higher in 3/5 years in all nine grid groups.

The peak CPUEs occurred in 2002-03 or 2003-04 in most grid groups.

The 2004-05 CPUE was significantly lower than 2003-04 in most grid groups (8/9)

Fishermen and Scientists Research Society (FSRS)

The number of FSRS participants in the recruitment trap project within LFA34 has progressively increased from 3 in 1998-1999 to 45 in 2004-2005. The catch rate calculated from FSRS trap data shows a trend similar to catch rate calculated from commercial logbooks; lower in 1999-00, higher until 2003-04, and a drop in 2004-05.

Scallop Survey Data

The by-catch of legal size lobster during the scallop survey in areas 2A and 4A were lower than the mean for the first two years and higher than the mean for the last two years.

Limitations

The current analysis of log data does not account for changes in fishing efficiency e.g. improved traps or navigation, nor for variations in trap design, bait type and quantity, soak time, nor for any changes in fishing strategy – e.g. targetting certain sizes

**LFA 34 Exploitation Rate Abstract ( Ross Claytor)**

The exploitation rate represents the percentage of mortality caused by fishing. Four methods were used to examine exploitation rates.

The first examined changes in the size frequency of legal size animals is used to detect changes in exploitation rates. A reduction in exploitation rate would be indicated by an increase in the proportion of large legal size animals in the population. This method assumes there is no change in catchability or targeting of specific size groups and are usually not satisfied. As a result this indicator is used only to estimate average levels of exploitation which have been around 80%.

The second was length cohort analysis (LCA). It has the same assumptions as the first method. It estimates exploitation rate for LFA 34 as 68% and for grid group 2A about 75%.

The third uses a change in ratio (CIR) method. The exploitation rate assumes a closed population and three constant factors: catchability between size classes, catchability between monitoring traps and commercial traps, and ratio of fleet on monitoring trap effort. With these assumptions, the estimates are most reliable when narrow, adjacent size-classes are used. Significant and reliable estimates were obtained only from grid groups 2A and 2B combined. These estimates ranged from 70 – 90%. Sample sizes in other areas were too low.

The fourth is a new method for lobster assessments and is based on Gould-Pollock (GPD) depletion methods. It assumes the population is closed with respect to death, birth, permanent immigration and emigration. These are not likely true for the entire year, but may be for short time periods. Estimates using this method for grid group 2A ranged from 60 – 90 %.

*Fishing pressure indicators* - Fishing pressure indicators are used by management to design effort control measures. It is necessary to evaluate fishing pressure levels and trends to plan management measures and to evaluate their success. The lobster fishery having no reference points, scientists concentrate on fishing pressure trends. Indicators examined include effort distribution, commercial fishing effort and exploitation rate.

*Effort distribution* - Most of the effort is exerted on the near-shore grounds. However, increased effort is taking place in the mid-shore and offshore areas.

*Commercial fishing effort* - The commercial fishing effort indicators are the number of grid/fisherman/season, average number of days fished/fisherman/season, and number of trap hauls. There appears to be an increase in the number of grids fished, a decrease in the number of days fished, and a decrease in the number of trap hauls in the near-shore. The latter is a concern if it represents a decline in lobster abundance in the near-shore.

## COMMENTS FROM SCIENTIFIC REFEREES

### 1) Review of the Working Document

*Stock Status and Indicators for the Lobster Fishery in Lobster Fishing Area 34*

**Referee**: Paul J. Rago, Northeast Fisheries Science Center, National Marine Fisheries Service, Woods Hole, MA 02543

### A. Data Sources

The assessment scientists, in a cooperative research project with industry, developed an impressive set of data for the assessment of lobsters in LFA 34. The logbook data provided, for the first time, documentation of the changes in the spatial distribution of fishing effort and landings. The FSRS data provided a useful validation of the patterns observed in the larger scale logbook program. Together, these data collection programs will provide a solid base for future assessments.

Consideration should be given to integrating the newly acquired data with the historical record. The long time series of catches, extending from 1900's could provide an unprecedented record of long term productivity of the lobster populations and possible influences of environmental changes.

Although still preliminary, the by-catch rates of lobster in the scallop survey might ultimately be used as a fishery independent abundance index for lobsters. The potential for this survey as a lobster index will be limited by its spatial coverage. It did not appear to survey the entire lobster fishing area.

Finally, it would be profitable to compare the at-sea observer data with the vessels participating in the FSRS program. The FSRS program consists of fishermen keenly interested in improving the underlying assessment data. It would be useful to compare the catch rates between FSRS vessels and observed vessels. Another consideration that should be investigated is the use of fixed stations. Technically, repeat sampling of fixed station represents a measure of local habitat conditions over time. Alternatively, fixed sampling sites might serve to concentrate fishing mortality at high density sites. This might be testable by comparing interannual patterns of fishing effort in the vicinity of the fixed stations.

**B. Abundance Indices and Measures of Production**

Trends in abundance are defined in terms of a ratio of the last five years average to the average of 1998-99 and 1999-00 fishing years. This approach will tend to reduce the ability to detect recent trends. There is no right or wrong way to define the trends but there are tradeoffs associated with alternative definitions. In particular, the use of the ratio of the last 5 years to the previous two will reduce the ability to detect recent differences. The variance of the denominator, with only 2 years, is likely to be poorly estimated so the overall variance (or sensitivity) may be higher. Thus the ability to correctly categorize trends into "+, 0, -" bins may also be compromised. It might be useful to examine the properties of a ratio defined by ave (X(t), X(t-1)) vs ave (X(t-2),...X(t-6)) as a way of characterizing stock status.

The magnitude of the effect does not appear to enter into the definition or "+,0,-" categories but I was not exactly sure how the "0" designation was defined. The scoring algorithm should be specified quantitatively. If A =B does this mean that the confidence intervals overlap? Was a specific test for "no trend" used? Could independent observers reach same conclusion?

The use of nonlinear mixed effects model to describe catch rates represented a major advance for analyzing CPUE data as it appears to be a more realistic model of the underlying error structure of the data. One minor note -- the I, j, k indices need to be defined as season-day, year, and license, respectively.

The lack of increase in larger size classes, despite the long term increase in landings suggests that most of the increase in production has been transferred to the fishery rather than accruing to the population. The reproductive capacity of the stock does not appear to have increased appreciably. The high proportion of landings from lobsters that have just molted above the legal size limit should be closely monitored. The ratio of sub-legal to legal sized lobsters in the FSRS traps and observer data may be another approach to tracking/forecasting this trend. A high proportion of newly recruited individuals implies increasing risk to the fishery. Little buffer would exist if conditions that have fueled the increases in recruitment were to change.

If sufficient historical landings data are available, it may be useful to examine the ratio of inshore to offshore landings.

### C. Fishing Pressure

Three models were used to quantify fishing pressure. All of the models indicate that fishing mortality is very high. High rates of fishing mortality increase the signal to noise ratio and results in convergence of estimates in age or stage based models. Models that might otherwise be untenable, e.g., models assuming constant recruitment, become plausible when fishing mortality quickly removes new recruits from the population. The three models used to characterize exploitation (change in ratio, length composition analysis, and depletion model) all provide similar estimates of exploitation rates. Unfortunately, continuously high rates of fishing mortality provide little insight into the carrying capacity of the resource in general. For lobsters in particular, the increase in recruitment over the last 15 years appears to be driven by environmentally induced improvements in pre-recruitment survival rather than rather than increased stock size.

Cluster analyses or appropriate multivariate method (regression tree?) might be a useful way to analyze changes in effort location by permit. Candidate variables might be vessel size or age, permit "age", owner experience, distance from port, etc.

The apparent shift of the fleet to more offshore areas is of general concern, especially since the trend is detectable during a period of time. Coincident increases in the fraction of soft-shelled lobsters is also a concern to be monitored. If effective fishing effort has been increasing over the last 7 years, then the changes in CPUE will be underestimates of the change in true abundance. It may be profitable to investigate the use of autoregressive models to determine if effort in location x in year t can be expressed as a function of area specific CPUE in year t-1. Spatial analyses of other fisheries has suggested that the CPUE in a newly fished area will increase as the harvesters become familiar with the bottom features and current. Later, the CPUE declines as the resource is depleted. The decrease in CPUE occurs despite continuously improving fishing power, the local depletion will be underestimated. The consequences for the resource as a whole can be even more dramatic.

The change in ratio estimator might be applied to the change in proportion of ovigerous females over the course of a season but this would require the assumption that berried females had constant catchability over the course of the fishing season

### D. Other Comments.

Quantification of fishing power in trap fisheries is a difficult proposition. Most assessments conclude that changes in operational fishing patterns have occurred over time but cannot fully quantify such changes because the historical data do not exist. Alternatively, the changes cannot be quantified because the readily available data, such as vessel size or horsepower are only weakly associated with fishing power. Changes in the use navigation software, bottom mapping software, trap type or use of hydraulic winches are not available. Hence it is important to begin a baseline for characterization of current fishing patterns. Given the cooperative nature of work, a survey of existing fishing practices could serve as a basis for long term management. Such a survey could identify relevant factors for future comparisons of fishing effort, especially when fishing effort is thought to have changed. Factors to be considered would include numbers of traps fished, soak times, numbers of hauls per day, etc. The overall scope of the survey would be established by working closely with industry.

The process of setting up the survey might also lead to better definitions of effective fishing effort. In turn it may be possible to improve the assessment by revisiting historical data.

It may be useful to use Lorenz curves to characterize the degree of concentration of the fishery over time. Concentration can be expressed in terms of either space or time, using effort, catch or catch per unit effort as response variables. The basic approach is to order the y observation, e.g., catch or effort, and plot the ordered values (from largest to smallest) against cumulative area or time. As a simple example, suppose we have three observations of catch say ($c_1$,$c_2$, $c_3$) caught in 3 areas ($a_1$,$a_2$,$a_3$) and $c_2>c_3>c_1$. Let $p_i=c_i/(c_1+c_2+c_3)$ and $P_j$ =cumulative distribution function for the ordered $p_i$. A plot of the $P_j$ vs cumulative area constitutes the Lorenz curve. In this simple example, the plot would be

1. $p_2$ vs $a_2$
2. $p_2+p_3$ vs $a_2+a_3$
3. $p_2+p_3+p_1$ vs $a_2+a_3+a_1$

The degree of quantification could be expressed with the Gini index. An increased concentration of fishing effort could indicate increasing reliance on a particular time period (say the first n days after opening) or a reduction in the fishing area. If the spatial concentration of fishing effort remains similar over years but the loci of fishing effort had changed, it could be an early warning sign of serial depletion.

Overall the assessment was excellent and tribute to the hard work and commitment of the scientists, managers and fishermen. The collaborative project has laid a firm foundation for future assessments and identified key areas for future research. Despite the relatively short data series and lack of contrast in exploitation rates, the fine scale temporal and spatial data permitted the detection of subtle but important changes in fishing effort, lobster size, and shell quality. This type of information will be extremely useful for developing measures to ensure the productivity of the lobster resource and the fishery it supports.

**Referee**: Michel Comeau, Gulf Fisheries Centre, Moncton, NB

**General Comment**

The lobster stock status for LFA 34 was greatly improved from the establishment of a logbook reporting system. Biologists now have more reliable data on landings, in addition to information on nominal effort and the location of that effort within the LFA to assess the lobster fishery. The collaboration between DFO biologists and fishermen through the Fishermen and Scientists Research Society (FSRS) is also a real asset for producing more accurate analysis. This collaboration allow for more input directly from fishermen. Finally, the collaborative effort from a team of scientists from BIO improved the quality of this first draft.

**Abundance Indicators**

1. All the indicators clearly suggest that lobster abundance in LFA 34 for the last five years is higher than average.
2. Landings by grid areas are higher in the fall period and have increased in the last 5 years. However, increasing trends in landings were not observed in the winter and spring periods. These trends in landings suggest a very high exploitation level.

3. There is a decrease from 85% to 65% of landings for the nearshore in the last 5 years. Simultaneously, an increase in landings was observed for the mid- and off-shore. Since the CPUE are still high in both regions, it is not viewed as a negative indicator at this point but should be closely monitored.
4. The change in the location where lobsters are caught indicates a change in the fishing strategy by fishermen.
5. The catch rates were not adjusted for soak time. This should be mentioned and discussed in the document. Any information related to soak time in terms of double hauls and the duration should be included.
6. The variations observed in the catch rate from the FSRS compared to the logbook should be discussed. Because of the variance, trends from the FSRS data should not be taken into consideration (too great of a variance to detect an actual trend), however, the catch rate levels are relevant and should be discussed.

**Fishing Pressure**

7. Four different methods were used to calculate the exploitation rate. Although some assumptions needed to use these methods are not met, with high estimates of exploitation rates those different methods are reliable and will gave good estimates.
8. Caution should be used on the estimate derived from the size composition method as changes of the size of the escape mechanism would induce a bias in the estimates. It should be discussed in the document.
9. Caution should also be used if the exploitation rate is referred as the "extended exploitation rate". The reason to increase the minimal legal size is to increase the number of females that will spawn at least once, not for reduce the exploitation rate. In terms of risk analysis, reducing the exploitation rate should allow for more animals to survival the fishing for more than one year and in turn increase the abundance of larger animals. This will then allow the fishery to rely on more than one size group (recruit to the fishery) and achieve a more sustainable fishery. Using the extended exploitation rate will underestimate the pressure on the fished population. The strict exploitation rate will give a more accurate estimate of the pressure on the exploitable portion of the lobster population. This should be clearly explained in the document.
10. Estimates from Length Composition Analysis (from Log estimates) seem to be quite reliable.
11. The Change-In-Ratio method gives good estimates of the exploitation level.
12. A general comment for the estimated exploitation rates is that although no negative trends were observed, the level of the exploitation rates, being in the 70% to 80%, should be flagged as being problematic for the long-term sustainability of the fishery in LFA 34 and this indicator should be considered as negative. This should be clearly stated in the document. High exploitation levels could be responsible for the low abundance of large animals even though the level of recruitment for the last 5 years has been very high and should have created an accumulation of larger animals. This is not the case. Lowering the exploitation rate should be clearly stated in the recommendations as fisheries relying heavily on the annual contribution of new recruits into the fishery (recruitment fisheries) are seldom stable. Hence, if this period of very high recruitment is followed by years of poor recruitment, it is not unconceivable that this very lucrative fishery could go from boom to bust, as seen in other areas.

**Referee:** Rod Bradford, DFO-Science, BIO, Dartmouth, N.S.

General Comments:

This assessment applied both fisheries-dependent and fisheries-independent indices of stock status. While further work, acknowledged by the authors, is required to determine which of the various datasets are most informative with respect to both current stock status and trajectory, it is quite clear that science is on much firmer footing than before implementation of the LFA 34 conservation management plan which includes scope for government-industry collaborative data gathering and monitoring frameworks. Continued participation by industry in the development of science advice can only be encouraged.

The 'Introduction' section appears to be organized around a chronological description of changes in management of the LFA 34 fishery since 1998 and as specific conservation measures came into effect. The main body of the manuscript then proceeds to develop indicators of status relative to five year means, with the result that it isn't clear if the reader should be interpreting the information in the context of conservation benefits since the implementation of specific measures or relative to the last assessment. A sentence to clarify why the advice five year time periods is used (since last assessment) would be helpful.

Production/Abundance

Information acquired since 1998 in conjunction with industry offers a promise of allowing interpretation of trends in various indicators with time into the future. Lack of information concerning effort prior to 1998 hampers interpretation of current status and any future change (either positive or negative) relative to historical levels of abundance. While is clear from the recent data that abundance is likely higher, it isn't obvious by how much relative to historical levels in the absence of data on past effort associated with reported catch.

I would prefer to see a qualifier associated with the statements concerning the relative high importance of the LFA 34 fishery to the lobster industry. While LFA 34 contributes approximately 40% of current landings, the total contribution to Canadian landings was as low as 20% in recent years, only partially because LFA 34 landings are higher (i.e., landings elsewhere have declined). The fact that reported landings from all lobster fishing areas outside of the Bay of Fundy-Gulf of Maine are below historic highs (all realized since 1987) is probably worth a statement.

1) Time series of landings (1892 to present): Increases in landings since 1981 have been observed in other regional fisheries (gaspereau, and eel for example). The increased landings can be linked to increased effort. While it is understood that historic measures of effort would probably be difficult to reconstruct, I recommend the document add (to table 3.1.1) columns which report minimally by year number of active licences, amount of gear under licence, and if available number of licences reporting catch.

2) For the years of mandatory logbook reporting indicate compliance with reporting: what percentage of the licence holders returned logbooks for each reporting year? Is there information available in archived purchase slips which, for example, could minimally indicate the duration of participation by the fishers by year? It isn't clear from the presentation if the zero catches which were removed from the analyses represent a 'did not fish' report on the part of individual licence holders.

3) Section 3.4.1 Catch rate from FSRS traps: Would there be any value in the frequency of zero catches as an indicator of spatial and inter-annual variability? Is there an association between occurrences of zero catches and the trap string being moved to another location, for example?

4) Coarse inspection of Figure 3.5.3 (Scallop Survey) suggests a tendency for the index of legal-sized lobster to lag the sub-legal index by about a year? Have (could) the trends in the two time series been examined in the context of the sub-legal times series as a forecaster of legal-sized lobster abundance?

Fishing Pressure Indicators

5) A general comment: Several pieces of information seem to indicate that exploitation of lobster in the deeper water strata (or those further offshore) has a) increased in recent years, and b) increases with time within-season. The effects of the spatial shift in fishing activity on indicators of fishing pressure are not well represented in the fishery-independent abundance/size indices (e.g., FSRS data). Change in fishing patterns may therefore warrant mention as a source of uncertainty.

6) Section 4.5: Depletion model estimates. The manuscript is unclear on which lobster catch data set has been modelled (the fishery or the FSRS sub-set), and therefore to which dataset figs. 4.5.3 to 4.5.5 refer to (Figure captions indicate the FSRS data has been modelled). The sentence (page 22 under sub-section 'FSRS data') "However, temperature and effort are also highly correlated ..." might be more concisely stated as "However, temperature and our index of effort are also highly correlated ..." One can envisage how effort summed for each day could be correlated with temperature, yet the FSRS data includes catch on a per trap basis. Thus, while there may be fewer data points at lower temperatures, each trap record is an independent data point.

7) Depletion model estimate continued: The authors may wish to explore the relation between catch and an alternative (from daily average) temperature index. Although the water column within LFA34 is typically well mixed variability around the daily average temperature might still be sufficient to affect lobster activity levels and therefore their availability to capture on time scales shorter than 24h.

## COMMENTS FROM THE INDUSTRY MEMBERS OF THE SCIENCE COMMITTEE

### Working Paper Review (Science Committee)

*Denny Morrow*

Has there been an increase in the number of licenses, thereby increasing the number of traps?

If there is a downward trend, there needs to be input to management. The recent trends are very important and it would be more beneficial to assess these things on an ongoing basis.

Ecosystem indicators: temperature is important to quality, especially since shift to offshore. But he does not feel it affects the stock.

There has been a shift to offshore. What is the possible impact of this to the stock? Since more large lobsters being caught are we fishing out broodstock?

CPUE data comes from 2a and b. How does that compare to the rest of LFA 34?

Disappointed on exploitation rate focus on 2a and b. Could have done 1, 3, 4a?

Feels the catch reached its peak in 2003.

Sea sampling is a data source we need and that should be stated in the document.

On page 28 in regards to exploitation rate there is talk of a buffer but there is no discussion of what the buffer might be.

It is important to spread out the FSRS recruitment traps since the pre-recruit data is so beneficial.

We could be including berried females in sampling such as the soft shell project.

On page 28 there is mention of recommended studies on newly-settled lobster. Would the cost of this be worthwhile over studying something else? Would rather see berried females and pre-recruits studied in depth instead.

**Responses**

*Ross Claytor*

Agreed that pre-recruits and berried females are important indicators.

The shift offshore can have stock consequences. Increased pressure reduces the buffer and this is dangerous.

In regards to exploitation rate, did not want to present areas that did not have enough data.

Would definitely be useful to have more sea samples and the FSRS commercial trap sampling done by the fishermen would be good for this, since the traps are recorded daily. There are fishermen doing this in LFA 33, but we need LFA 34 fishermen involved.

There has been a huge increase in pre-recruit data due to the FSRS study, but it is clear there is not enough (especially in the offshore and midshore areas).

FSRS is working on developing a berried female logbook for fishermen to use. Trent Shaw is testing this.

*John Tremblay*

Management is involved in the review of the process.

It is doubtful an assessment at this level will be done every year, but probably could provide some overview each year.

Reasons for studying newly-settled lobster - Most mortality occurs in this stage. Also, the data collected doesn't come from trap. So it is important.

## OTHER COMMENTS, QUESTIONS AND ANSWERS: GENERAL DISCUSSION

### LFA 34 Lobster Stock Assessment - Wednesday, February 1, 2006

*Ian Marshall*

Q: Why were 1998-99 and 1999-00 selected as the reference period?
A: Because most of the data in this assessment comes from the logbooks, and the last assessment was in 2001.

*Denny Morrow*

Q: How many licenses were there at the time of the last RAP? If there was an increase, this needs to be noted.
A : 963.....There has not been an increase.

*Carl MacDonald*

Clarification: FSRS traps are not supposed to move around, but some in the mid-shore and offshore did because this was the only way we could get coverage in these areas.

### Oceanography Questions

*Wayne Spinney*

Q: Do the satellite images give accurate readings for surface temperatures?
A: Yes, but the satellite readings can be off by +/- 1 degree C. The satellites are most useful for detecting gradients in temperatures, not absolute values. When the data is processed, there may be inaccuracies. New equipment (Pathfinder 5) will be more accurate.

*Ricky Nickerson*

Comment : It is so important to recognize the benefit of the FSRS temperature recorders, which supply a lot of this information. It is nice to see the information collected by the FSRS being used.

*Denny Morrow*

Comment: Feels temperature changes in the Gulf of Maine will not impact lobster abundance, but do affect the quality. He is concerned that predators, food supply, critical habitat, and impacts from other fisheries have just as much, or more, of an affect on abundance. If temperature is not important it is first necessary to look at and determine it is not important before disqualifying it.

*Ricky Nickerson*

Comment : Temperature definitely affects catch. Lobsters are not caught when it is too cold.

*Ashton Spinney*

Should have at least one annual update to industry.

Recommend the berried female data collection (initiated by Trent Shaw) be elaborated.

Brian Petrie's work should be included in the document. The value is tremendous.

Exploitation. When this leaves this table and goes to Ottawa, we have concern as to how it is interpreted. Want it to be explained carefully and clearly and simply.

The 80% exploitation rate - does this mean 80% of what is landed, or 80% of the total population?

- 40-80% in the 81-90 size range.
- 65-70% exploitation rate means you are removing 65-70% of that size group in the population.

**Replies**

*Ross Claytor*

To do the analysis we broke the estimate into 3 size groups. We separated males and females and separated sizes to satisfy the assumptions. This all only applies to the area we're dealing with (2a).

*Carl MacDonald*

The project with Trent Shaw (berried females) records the number of berried females per trawl, so recording the information aboard the boat should not be a problem. There are three groupings: 0-90mm, 91-120mm, and greater than 120mm. A measurement device is used with three color codes for each size range, red, green, and blue.

*Wayne Spinney*

Q: FSRS movement of traps, does not understand how can this be used.

Q: Scallop survey: Would you get a different reading in areas not typically fished than in those generally fished?

**Replies**

*John Tremblay*

Movement of the FSRS traps –Only used those moving within a grid group. Not much weight is put on the scallop survey. There is certainly more work to do.

*Craig Prouty*

Has a problem with the suggestion of yearly trends. Catch is so affected by environment, etc. and (for example) the last two winters have been extremely cold, and this winter has been extremely warm. Prefers the 5 year trend.

*Ian Marshall*

Will the berried female survey be only for FSRS members or will everybody be able to participate? Are there plans to expand it? How will you deal with recaptures?

*Carl MacDonald*

It is only experimental right now. Could use tags, although tagging studies have been done before, and the recapture rates are very low.

*Jim Jamieson*

This process is a major step forward. Pleased with fishermen, industry, management and scientists all working together on this.

It is good that the document includes temperature and recommends future priorities.

Should also include: 1) that there are other environmental factors that have not been dealt with in this assessment 2) egg production from various molt groups, and 3) some mention of v-notching and culls.

There are distinct components within the fleet and each are doing things very differently.(ie. Large fast boats moving around a lot compared to small slower boats that fish the same area all season). Should look at what the impact of various methods of fishing are within LFA 34.

**Replies**

*John Tremblay*

We do not have much data regarding v-notching and culls, and eggs per recruit probably has not changed since 2000.

*Ian Marshall*

Recommend that the document includes "...and regulatory compliance are essential" on pg 28 (in regards to collecting values information in the future.

Number of days fished – this year fishermen cannot afford to go more than once a week because of gas prices, so in this way, effort has decreased.

*Carl MacDonald*

Regarding the science traps offshore: we could get more traps out there, but when they are offshore, they *will* be moved, due to the constant movement of the fisherman's gear. We could work on developing something new for offshore.

**Appendix 1.** Letter of invitation.

17 January 2006

To : Distribution

**Subject:** Scientific Peer Review of the LFA 34 Lobster Stock Assessment

The assessment of the Lobster Fishing Area 34 lobster stock will be take place at the Rodd Grand Hotel in Yarmouth, Nova Scotia, 1-2 February 2006

The purposes of peer review are to examine scientific approaches used for the assessment, to identify weaknesses in methodology, to help improve the clarity of assessment, to make research recommendations as deemed appropriate, as to prepare scientific advice. The session includes detailed review of working papers and resulting Science Advisory Report (SAR) as prepared by the DFO Science team in charge of the assessment.

At the meeting, DFO Science staff will first provide an overview of the assessment that should include the main conclusions, the supporting evidence, any new methods, and major limitations. The presentation will be followed by a scientific review by the scientific referees.

After the referees, members of the LFA Science Committee, DFO Fisheries Managers and industry representatives on the LFA 34 Advisory Committee will have the opportunity to ask questions and provide input. The summary bullets of the Science Advisory Report will be reviewed at the meeting. The minutes of the meeting will be published as Proceedings.

The working paper for this meeting may be downloaded from the following RAP website as of 23 January 2006 (the password is " lob342006 " in all lower case letters).

http://www.mar.dfo-mpo.gc.ca/science/rap/internet/workingpapers2006.htm

The Remit and Agenda are attached. If you have any question, please contact me at (902) 826-2175 or John Tremblay at (902) 426-3986

We greatly appreciate your contribution to this important and valuable meeting.

*Original signed by:*

René E. Lavoie,
Science Branch,
Maritimes Region

Attachments (2)

cc: M. Sinclair, R. Claytor, J. Tremblay, R. O'Boyle, V. Myra, J. Landry

**Appendix 2**. Lists of Invitees.

## LOBSTER FISHING AREA 34 ADVISORY COMMITTEE

| APPOINTED MEMBERS | AFFILIATION |
|---|---|
| Ian Marshall<br>A/Area Director, SWNS<br>215 Main Street<br>Yarmouth, Nova Scotia B5A IC6 (902) 742-0871 | DFO (Area Director) |
| Anne Sweeney<br>A/Chief-Resource Management<br>215 Main Street<br>Yarmouth, NS B5A 1C6 (902) 742-0859 | DFO (Resource Mgmt) |
| Jim Jamieson<br>Sr. Advisor<br>P.O. Box 1035<br>Dartmouth, Nova Scotia B2Y 4T3 (902) 426-8981 | DFO (Senior Advisor) |
| Jim Nelson - Economist<br>P.O. Box 1035<br>Dartmouth, Nova Scotia B3J 4T3 (902) 426-6786 | DFO (Economics) |
| A. J. Clarke<br>Area Chief, C&P<br>215 Main Street<br>Yarmouth, Nova Scotia B5A IC6 (902) 742-0885 | DFO, Yarmouth |
| Doug Pezzack<br>P.O. Box 1035<br>Dartmouth, Nova Scotia B2Y 4T3 (902) 426-2099 | DFO (Biologist) |
| Scott Coffen-Smout<br>Biologist-Oceans & Habitat<br>1 Challenger Drive<br>Dartmouth, NS B2Y 4A2 (902) 426-2009 | DFO (Biologist) |
| Greg Roach<br>P.O. Box 2223<br>Halifax, Nova Scotia B3J 3C4 (902) 424-4560 | N.S. Dept. of Fisheries and Aquaculture |
| Greg Peacock<br>Fisheries Management<br>P.O. Box 1035<br>Dartmouth, N.S. B2Y 4T3 (902) 426-3625 | DFO (Halifax) |
| David Flint<br>Dept.of S.O.S.A.<br>Dalhousie University<br>Halifax, NS B3H 3J5 | Dalhousie University |
| Rene Lavoie<br>1 Challenger Drive<br>P.O. Box 1006, BIO<br>Dartmouth, N.S. B2Y 4A2 (902) 426-2147 | DFO - Science |

| APPOINTED MEMBERS | AFFILIATION |
|---|---|
| Ross Claytor<br>Invertebrate Fisheries Division<br>Bedford Institute of Oceanography<br>P.O. Box 1006<br>Dartmouth, NS B2Y 4A2 (902) 426-4890 | DFO - Science |
| John Tremblay<br>BIO, Fish Lab, Room 221<br>1 Challenger Drive<br>Dartmouth, NS B2Y 4A2 (902) 426-3986 | DFO – Science |

| MEMBER | ASSOCIATION |
|---|---|
| Arthur Bull<br>RR#4, Digby, NS<br>B0V 1A0<br>(902) 834-2958 also faxes | Bay of Fundy Inshore Fishermen's Association |
| Denny Morrow<br>Nova Scotia Fish Packers Association<br>38-B John Street, Suite 1<br>Yarmouth, NS B5A 3H2<br>(902) 742-6168 Fax (902) 742-8391 | N.S. Fish Packers Assoc. |
| L.Wayne Spinney<br>RR#1 Meteghan, Box 107<br>Nova Scotia B0W 2J0<br>(902) 645-2273 Home<br>(902) 769-8165 Cell<br>(902) 645-3456 Fax<br>(902) 769-8166 Boat<br>email: wayne@melanjo.com | B.O.F.I.F.A / Bay of Fundy Inshore |
| Eric Roe<br>Clearwater Fine Foods Inc.<br>757 Bedford Highway<br>Bedford, Nova Scotia B4A 3Z7<br>(902) 443-0550 (Phone)<br>(902) 443-8443 (Fax) | Clearwater Fisheries |
| Richard Apostle (Professor)<br>David Flint (Student)<br>Dept of Sociology<br>Dalhousie University<br>Halifax, Nova Scotia B3H 3J5<br>(902) 494-6593 (Phone)<br>(902) 494-2897 (Fax) | Dalhousie University |
| Donna Rae Ltd.<br>P.O. Box 321<br>Lockeport, Shelburne Co.<br>Nova Scotia B0T 1L0<br>(902) 656-3178<br>(902) 656-2543 (evening) | |

| MEMBER | ASSOCIATION |
|---|---|
| Jonathan Lowe<br>NS Dept of Fisheries & Aquaculture<br>3 Lovitt Street, Suite 101<br>Yarmouth, NS B5A 3C1<br>Tel (902) 742-7102<br>Fax (902) 742-0615 | N.S. Dept of Fisheries & Aquaculture |
| Wilford Smith<br>Box 2B2<br>Port LaTour<br>Shelburne Co., N.S. B0W 2T0<br>Tel (902) 768-2519<br>Cape Breeze (902) 768-2418 | Chair LFA 33 / Advisory Committee |

## ELECTED REPRESENTATIVES

| ELECTED MEMBER | ELECTED ALTERNATE | AREA |
|---|---|---|
| Maurice Shand<br>Box 3<br>Shag Harbour<br>Shelburne Co., N.S. B0W 3B0<br>Phone: (902) 723-2588<br>Fax: 902-723-2239 (nextdoor) | | Bear Point<br>Prospect Point<br>Shag Harbour<br>**Port Cluster 32C** |
| John Symonds<br>RR#1<br>Woods Harbour, NS<br>B0W 2E0<br>Phone/Fax 723-2934<br>Boat 635-1320<br>Truck 637-7077 | Sandy Stoddard<br>P.O. Box 174<br>Woods Harbour, N.S.<br>B0W 2E0<br>Phone: (902) 723-2846<br>Fax: (902) 723-2824 | Forbes Point<br>Lower Woods Harbour<br>Falls Point<br>**Port Cluster 32C** |
| Charlie Holmes<br>Lower Clarks Harbour<br>Nova Scotia<br>B0W 1P0<br>Phone: (902) 745-3324<br>Fax: (902) 745-0238 | Sandy Goreham<br>General Delivery<br>Clarks Harbour<br>Shelburne Co., N.S.<br>B0W 1P0<br>(902) 745-1799 | Clarks Harbour<br>Newellton<br>Swim Point<br>West Head<br>**Port Cluster 32A** |
| Howard Ross<br>P.O. Box 294<br>Barrington Passage<br>Shelburne Co.<br>Nova Scotia<br>B0W 1G0<br>Phone: (902) 745-2051<br>FAX: (902)745-0836 (Put name of Fax) | Michael H. Newell<br>#463 Highway 330<br>North East Point<br>N.S.<br>B0W 2P0<br>745-1613 (home)<br>745-2698 (fax)<br>637-7392 (cell)<br>637-7437 (other) | Clarks Harbour<br>Newellton<br>Swim Point<br>West Head<br>**Port Cluster 32A** |
| Kevin Ross<br>P.O. Box 1475<br>Shelburne Co. N.S.<br>B0W 3J0<br>Phone: (902)745-3232<br>Cell: (902)635-0414<br>Boat: (902)637-7045<br>Fax: (902) 745-0239 | John Ross<br>Stoney Island<br>Shelburne Co. N.S.<br>B0W 1G0<br>Phone: (902)745-1245<br>Cell: (902)745-2933 | Bulls Head<br>Daniels Head Stoney Island<br>Cripple Creek<br>Northeast Point<br>**Port Cluster 32B** |

| ELECTED MEMBER | ELECTED ALTERNATE | AREA |
|---|---|---|
| NCNS Netukulimkewe'l Commission<br>Cory Francis, Frank Jesty, Tim Martin<br>P.O. Box 1320<br>Truro, Nova Scotia B2N 5N2<br>CELL: 899-0343<br>Phone: 895-7050 FAX: 895-8182<br>BSWFA - Alternating Attendance by Members | | |
| Chief Deborah Robinson<br>Acadia First Nation<br>RR #4 Box 5914-C<br>Yarmouth, Nova Scotia<br>B5A 4A8<br>Phone 742-0257 (Acadia Band Office) / 742-6513<br>Fax 742-8854 | | |
| Indian Brook Fisheries (Stephen Michaels)<br>PO Box 162<br>Shubenacadie NS B0N 2H0<br>(902)758-2711(Phone)<br>(902)758-2184(Fax)<br>(902) 751-0502 (cell) | | |
| Jeffrey D'Entremont<br>P.O. Box 159<br>Lower West Pubnico<br>Nova Scotia B0W 2C0<br>902-762-0196 (home)<br>902-648-7900 (cell)<br>902-648-8379 (boat)<br>902-762-0244 (fax) | | Abbotts Harbour<br>Ledge Harbour<br>Dennis Point<br>**Port Cluster33A** |
| Robert d'Entremont<br>P.O. Box 4<br>Pubnico, NS B0W 2W0<br>902-762-3062 (home)<br>902-648-7777 (cell)<br>902-648-8633 (boat)<br>902-762-0165 (fax) | | Lower East Pubnico<br>**Port Cluster33A** |
| Ashton Spinney (Co-Chair)<br>RR#1, Glenwood<br>Yarmouth Co., N.S.<br>B0W 1W0<br>648-8889 Cell (boat)<br>643-2490 (phone/fax)<br>648-7737 (cell)<br>648-8137 Cell (car) | Craig Prouty<br>P.O. Box 97<br>West Pubnico<br>Nova Scotia<br>B0W 3S0<br>(902) 762-0206 (phone/fax)<br>(902) 648-7180 (cell) | Camp Cove<br>Muises Point<br>Lwr Surettes Island<br>Morris Island<br>Sluice Point<br>**Port Cluster 33B** |
| Bob Newell<br>RR1, Box 3098<br>Arcadia, N.S. B0W 1B0<br>902-749-7839 (cell)<br>902-742-1659 (home)<br>bobgretha@hotmail.com | Trent Shaw<br>1381 Canaan Rd.<br>Yarmouth, NS B0W 3M0<br>648-0342 (Home)<br>740-2004 (Cell)<br>ivygoodwin@ns.sympatico.ca | Little River Harbour<br>Pinkney's Point<br>Porter's Cove<br>Wedgeport<br>Tuna Wharf<br>**Port Cluster 33C** |

| ELECTED MEMBER | ELECTED ALTERNATE | AREA |
|---|---|---|
| Cory Nickerson<br>PO Box 96<br>Arcadia, N.S. B0W 1B0<br>902-740-0345 (boat)<br>902-663-4708 (home)<br>902-740-4133 (truck)<br>candrnickerson@ns.sympatico.ca | Glen LeBlanc<br>Box 481<br>Lr Wedgeport, N.S.<br>B0W 2B0<br>902-663-2948 (home)<br>902-740-2228 (cell) | Little River Harbour<br>Pinkney's Point<br>Porter's Cove<br>Wedgeport<br>Tuna Wharf<br>**Port Cluster 33C** |
| Stewart Sweeney<br>Box 6660, RR3<br>Yarmouth, N.S.<br>B5A 4A7<br>902-742-5724 (home/fax)<br>902-740-0587 (cell truck)<br>902-749-6148 (cell boat)<br>902-742-9364 (bait shed)<br>gsweeney@ns.sympatico.ca | Steve Maillet<br>RR1, Box 1857<br>Yarmouth, N.S.<br>B5A 4A5<br>902-742-7453 (home)<br>902-749-7261 (cell)<br>skmaillet@ns.sympatico.ca | Kelly's Cove<br>Yarmouth Bar<br>Yarmouth Harbour<br>Town Point<br>**Port Cluster 34A** |
| Kevin Shaw<br>RR#5 Sandford Box 1669<br>Yarmouth Co., NS<br>B5A 4A9<br>Cell 749-6917<br>902-742-7608<br>fshaw@ns.sympatico.ca | Ellie Smith<br>Port Maitland<br>Yarmouth Co., NS.<br>B0W 2V0<br>902-649-2776 | Port Maitland<br>Chegoggin Pt.<br>Chegoggin Dyke<br>Sandford<br>**Port Cluster 34B** |
| Roger G. LeBlanc<br>P.O. Box 41A<br>RR#1 Meteghan River<br>Nova Scotia<br>B0W 2L0<br>902-769-3582 (phone/fax)<br>902-769-7275 (boat)<br>902-769-8092 (cell) | Carl Comeau<br>RR1 Saulnierville<br>Digby Co., NS<br>B0W 2Z0<br>902-645-2183<br>carl.dawn@ns.sympatico.ca | Belliveau Cove<br>Cape St. Mary<br>Church Point<br>Comeauville<br>Meteghan<br>Saulnierville<br>New Edinburgh<br>**Port Cluster 36 & 38** |
| Bruce Theriault<br>RR#1 Sandy Cove<br>Digby Co.,N.S.<br>B0V 1E0<br>902-834-2354 Phone/Fax<br>902-247-0828 (cell) | Stacey Denton<br>Little River<br>Digby Co., N.S.<br>B0V 1C0<br>902-834-2392 (home)<br>902-245-8614 (cell)<br>902-834-2223 (fax) | Centreville<br>Digby Wharf<br>Gullivers Cove<br>East Ferry<br>Little River<br>Sea Wall<br>Sandy Cove E.<br>Sandy Cove W.<br>Whale Cove<br>**Port Cluster 37 & 38B** |
| Clifton Thurber Jr.<br>Freeport<br>Digby Co., NS<br>B0V 1B0<br>902-839-2732<br>902-839-2723 (fax) | Peter H. Titus<br>353 Water Street<br>Brier Island<br>Digby Co., NS<br>B0V 1H0<br>902-839-2601(home/fax)<br>902-245-8004 (cell) | Coast Guard Wharf<br>Cove Wharf<br>Irish Town<br>Northeast Cove<br>Southeast Cove<br>Fish Point<br>Tiverton<br>**Port Cluster 37 & 38A** |

| ELECTED MEMBER | ELECTED ALTERNATE | AREA |
|---|---|---|
| C&P Supervisor<br>Dept. of Fisheries & Oceans<br>RR#4, Digby<br>Nova Scotia<br>B0V 1A0 | C&P Supervisor<br>Dept. of Fisheries & Oceans<br>P.O. Box 8<br>Meteghan, Digby Co.<br>Nova Scotia<br>B0W 2J0 | |
| C&P Supervisor<br>Dept. of Fisheries & Oceans<br>P.O. Box 193<br>Barrington Passage<br>Shelburne Co., N.S.<br>B0W 1G0 | C&P Supervisor<br>Dept. of Fisheries & Oceans<br>P. O. Box 68<br>West Pubnico, Yarmouth Co.<br>Nova Scotia<br>B0W 3S0 | |
| C&P Supervisor<br>Dept. of Fisheries & Oceans<br>P.O. Box 490<br>Shelburne, N.S.<br>B0T 1W0 | | |
| Ricky Nickerson<br>McGray Post Office<br>Shelburne Co, NS<br>B0W 2G0<br>(902) 745-3029<br>Fax 745-1758 | | Maritime, Local 9<br>Fishermen's Union |
| Carol Davis<br>Secretary LFA34<br>2 Vaughne Avenue<br>Yarmouth, NS B5A 4P1<br>Phone: 742-5782 or 9879<br>Fax: 742-4884 | | LFA 34 Committee |
| Updated: Dec.7/05(AA) | | |
| **Additional Invitees:** | | |
| David Robichaud<br>DFO Science<br>Biological station<br>St. Andrews, NB | Bruce Osborne<br>NS Dept of Agriculture and Fisheries<br>P. O. Box 2223<br>Halifax, Nova Scotia<br>B3J 3C4<br>Tel (902) 424-0352<br>Fax 424-1766<br>osbornbd@gov.ns.ca | Carl MacDonald<br>FSRS<br>PO Box 25125<br>Halifax, Nova Scotia<br>B3M 4H4<br>Tel 461-8119<br>Fax 461-0541<br>carlfsrs@auracom.com |
| Jean Lavallee<br>AVC Lobster Science Centre,<br>Atlantic Veterinary College,<br>University of Prince Edward Island,<br>550 University Avenue,<br>Charlottetown, Prince Edward Island<br>C1A 4 P3 CANADA<br>Tel 628-4392<br>Fax 894-2885<br>jlavallee@upei.ca | Mr Munemoto Nakayama<br>Representative, Japan Fisheries Association<br>Suite 1209, Duke Tower<br>5251 Duke St., Halifax, NS<br>B3J 1P3 | |

**Appendix 3**. List of Participants

| Participant | Affiliation/Address | Telephone | Fax | E-mail Address |
|---|---|---|---|---|
| | | | | |
| Amirault, Jerry | AVC Lobster Science Center | (902)456-9324 | | jamirault@upei.ca |
| Annand, Chris | DFO Resource Management | (902)426-3514 | (902)426-9683 | annandc@mar.dfo-mpo.gc.ca |
| Boudreau, Stephanie | Dalhousie University | (902)494-2478 | | s.boudreau@dal.ca |
| Boyd, Catherine | Dalhousie University | (902)405-5951 | | cboyd@dal.ca |
| Bradford, Rod | BIO/DFO, Dartmouth | (902)426-4555 | (902)426-1862 | bradfordr@mar.dfo-mpo.gc.ca |
| Claytor, Ross | DFO Science | (902)426-4721 | (902)426-1506 | claytorr@mar.dfo-mpo.gc.ca |
| Comeau, Michel | DFO, Moncton | (506) 851-6136 | (506)851-2147 | comeaum@dfo-mpo.gc.ca |
| D'Entremont, Jean-Guy | FRCC | (613)998-1143 | (902)762-3464 | jean.guy@ns.sympatico.ca |
| D'Entremont, Jeffrey | LFA 34 Rep. | (902)762-0196 | (902)762-0244 | jeffdentremont@hotmail.com |
| Frail, Cheryl | DFO Science, BIO | (902)426-5448 | (902)426-1862 | frailc@mar.dfo-mpo.gc.ca |
| Holmes, Allen | Barrington, NS | (902)637-3796 | (902)637-4081 | holmesab@gov.ns.ca |
| Jamieson, Jim | DFO, Dartmouth | (902)426-8981 | (902)426-9683 | jamiesonje@mar.dfo-mpo.gc.ca |
| Kenneally, Mary | Marine Affairs Prog. Dal | (902)670-0109 | | mkenneally@dal.ca |
| Kesick, Franz | Maritimes Aboriginal Aquatic Resources Secretariat | (902)895-2982 | | fkesick@mapcorg.ca |
| Lavallée, Jean | AVC Lobster Science Center | (902)628-4392 | (902)894-2885 | jlavalee@upei.ca |
| LeBlanc, Jennifer | S.A.R. Yarmouth County, NS | (902)648-2337 | | j_l_leblanc@yahoo.com |
| Lowe, Jonathan | Yarmouth, NS | (902)742-7102 | (902)742-0615 | lowejs@gov.ns.ca |
| MacDonald, Carl | FSRS, Dartmouth | (902)461-8119 | (902)461-0541 | macdonaldcd@mar.dfo-mpo.gc.ca |
| Maillet, Steven | LFA 34 Rep. | (902)742-7453 | | skmaillet@ns.sympatico.ca |
| Marshall, Ian | ADSWNS | (902)742-0841 | (902)742-6893 | marshalli@mar.dfo-mpo.gc.ca |
| Meillet, Raymond | Fishing | (902)742-5909 | | |

| Participant | Affiliation/Address | Telephone | Fax | E-mail Address |
|---|---|---|---|---|
| Morrow, Denny | Exec. Dir, NS Fish Packers Assoc. | (902)742-6168 | (902)742-1620 | fishpackers@klis.ca |
| Nelson, Jim | DFO Policy & Economics | (902)426-6786 | (902)426-6767 | nelsonj@mar.dfo-mpo.gc.ca |
| Newell, Bob | LFA 34 Rep. | (902)742-1659 | | bobgretha@hotmail.com |
| Nickerson, Cory | LFA 34 Rep. | (902)633-4708 | | candrnickerson@ns.sympatico.ca |
| Nickerson, Ricky | MFV | (902)745-3029 | (902)745-1768 | rcjn@klis.ca |
| Petrie, Brian | BIO/DFO, Dartmouth | (902)426-3809 | (902)426-6927 | petrieb@mar.dfo-mpo.gc.ca |
| Pezzack, Doug | DFO Science | (902)426-2099 | (902)426-1862 | pezzackd@mar.dfo-mpo.gc.ca |
| Prouty, Craig | LFA 34 Rep. | (902)762-0206 | (902)762-0206 | gennnycraig@ns.sympatico.ca |
| Raco, Paul | NMFS, Woods Hole, MA | (508)495-2341 | (508)495-2393 | paul.rago@noaa.gov |
| Robichaud, David | DFO Science, SABS | (506)529-8854 | (506)529-5862 | robichaudd@mar.dfo-mpo.gc.ca |
| Ross, Howard | Barrington Passage, NS | (902)745-2051 | (902)745-0836 | |
| Ross, Kevin | LFA 34 Rep. | (902)745-3232 | (902)745-0239 | kevinross@ss.eastlink.ca |
| Shand, Maurice | Shad Harbour, NS | (902)723-2588 | | moeval@hotmail.com |
| Spinney, Ashton | LFA 34 Rep. Co-chair | (902)643-2490 | | ashton@ns.sympatico.ca |
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| Sweeney, Anne | DFO, Yarmouth | (902)742-0859 | (902)742-6893 | sweeneya@mar.dfo-mpo.gc.ca |
| Sweeney, Stewart | LFA 34 Rep. | (902)742-5724 | (902)742-5724 | cgsweeney@ns.sympatico.ca |
| Tremblay, John | DFO Science | (902)426-3986 | (902)426-1862 | tremblayj@mar.dfo-mpo.gc.ca |
| Whynot, Larry | Native Council of Nova Scotia | (902)889-1404 | (902)354-2388 | |

**Appendix 4.** Agenda.

**LFA 34 Lobster Stock Assessment**

**1-2 February 2006**

**Rodd's Grand Hotel**
**417 Main Street**
**Yarmouth, NS**

Wednesday, February 1

09:00: Opening remarks - René Lavoie, Chair

09:20-9:40: Introduction to the assessment - Doug Pezzack

9:40-10:10: Temperature regime – Brian Petrie

10:10-10:30: Break

10:30-11:30 Abundance indicators - Doug Pezzack and John Tremblay

11:30-12:00 Exploitation rate indicators - Ross Claytor

12:00-13:15: Lunch

13:15-13:45: Production indicators - Doug Pezzack and John Tremblay

13:45-15:00 Review of Working Paper – to begin with scientific referees - Rod Bradford, Paul Rago, Michel Comeau

15:00-15:30: Break

15:30-16:30: Working Paper Review continued.

16:30- End of the day

Thursday, February 2nd

09:00-9:15: Recap – René Lavoie, Chair

09:15 to 10:00: Review and discussion of the Science Advisory Report

10:00-10:30: Break

10:30-12:00 : Review and discussion of the Science Advisory Report

12:00: End of meeting

**Appendix 5.** Meeting Remit.

Meeting of the Maritimes Regional Advisory Process Lobster in LFA 34
Feb. 1-2 2006

**Background**

LFA 34 is the largest LFA in Canada with landings exceeding 18,000t. It lies on the eastern side of the Gulf of Maine which also includes lobster fisheries in the Bay of Fundy (LFA 35-38), Canadian offshore (LFA 41) and the large USA fisheries of Maine, New Hampshire, Massachusetts and offshore.

The status of the lobster resources in LFA 34 was last assessed in 2001. The fishery presently operates under the 2001-2004 Conservation Harvesting Plan, which needs to be reviewed and updated. As part of Scotia-Fundy's Lobster Conservation Strategy, it is recommended that within each LFA indicators be developed that are supported by a broad representation of stakeholders.

**Objectives**

- Evaluate 2004 stock status of lobster stocks in LFA 34
- Recommend indicators for monitoring the future health of the lobster stocks.

**Products**

1. One Stock Status Report for LFA 34
2. Proceedings recording the minutes of the meeting
3. Research documents containing the technical details of the assessments

**Participation**

DFO scientists
DFO fishery managers
Industry
Non - DFO reviewers
Provincial advisors
First Nations

**Appendix 6**. Documents Tabled and References.

Pezzack, D., J. Tremblay, R. Claytor, C. Frail, and S. Smith. 2006. Stock status and indicators for the lobster fishery in Lobster Fishing Area 34. DRAFT AS OF JAN. 26th, 2006. CSAS RAP Working paper 2006/01, 121 p.

Pezzack, D., J. Tremblay, R. Claytor, C. Frail, and S. Smith. 2006. Stock status and indicators for the lobster fishery in Lobster Fishing Area 34. Sections 4.2 and 4.3 to be inserted in page 17 on the document listed above.

**Appendix 7.** Minutes of the LFA 34 Lobster science committee meetings : February, June, September, November 2005 and January 2006.

**Meeting of February 14, 2005**

A meeting of the LFA 34 Science Committee was held on Feb. 14, 2005 by conference call. The following people attended:

| Participant | Organization | Phone | Fax/ Address | e-mail |
|---|---|---|---|---|
| Doug Pezzack | DFO Science | | | |
| Ricky Nickerson | Fishermen, LFA 34 | | | rcjn@alis.com |
| Bruce Osborne | Province | | | osbornbd@gov.ns.ca |
| Ian Marshall | DFO Yarmouth | | | |
| Ashton Spinney | Fishermen, LFA 34 | | | |
| Anne Sweeney | DFO Yarmouth | | | |
| Trent Shaw | Fishermen, LFA 34 | | | |
| Wayne Spinney | Fishermen, LFA 34 | | | |
| Kevin Ross | Fishermen, LFA 34 | | | |
| Cheryl Frail | DFO Science | | | |
| Carl MacDonald | FSRS | | | |
| Ross Claytor | DFO Science, Chair | 426-4721 | 426-1862 | claytorr@mar.dfo-mpo.gc.ca |
| Not in attendance | | | | |
| Jean Lavallee | PEI Vet College | | | |
| Craig Prouty | Fishermen, LFA 34 | 762-0206 | | |
| Jim Jamieson | DFO Fisheries Managment | | | |

Please complete phone and fax numbers (or address for mailing) and e-mail if available.

The agenda included:

1. RAP schedule and remit
2. Soft-shell update
3. Funding for science

**1. RAP Schedule and Remit**

Ross Claytor proposed that the RAP scheduled for LFA 34 in June 2005 be postponed until January 2006. DFO diadromous, marine fish, and invertebrate assessment staff are being combined into one group. Ross expects to play a major role in the assessment and because he is the manager of this new group will not have time to concentrate on the assessment until later in the year. A plan was put forward to provide data summaries and analysis to the science committee in June, October, and December. This will give the committee more time to evaluate assessment data and interpretations and will improve the assessment overall. Fisheries management indicated that because the assessment would occur after the start of the 2005-2006 season that there would be no change in the management plan for the 2005-2006.

The assessment will concentrate on indicators of population trends for legal, pre-recruit, spawners, exploitation rate, distribution, and environmental conditions. The indicators and main data sources are given below:

| Indicator | Data source |
|---|---|
| Legal size lobster | Mandatory logbooks |
| | FSRS recruitment traps |
| | At sea sampling |
| Sub-legal lobster | FSRS recruitment traps |
| | At sea sampling |
| Spawners | FSRS recruitment traps |
| | At sea sampling |
| | Mandatory logbooks |
| Exploitation rate | FSRS recruitment traps |
| Distribution – lobster | FSRS recruitment traps |
| | At sea sampling |
| | Mandatory logbooks |
| Distribution - fishery | Mandatory logbooks |
| Environment - temperature | FSRS recruitment traps |
| | Coastal monitoring stations |

DFO indicated that data from 1998 – 2005 would be used from the mandatory logbooks. Initial analyses would provide estimates of percentage compliance and summarized catch and effort by port cluster, and grid. A summary of these would be provided at the LFA 34 Advisory Committee on March 1, and a more extensive report would be presented to the committee in June. Several of the fishermen pointed out examples where individuals have mis-reported logbook landings and lowered the price. In some cases landings had been reported as doubled and price as half what was actually provided as a way of building up a catch history. DFO will put together the data summaries and then industry would identify cases where the trends in the data do not match fishermen's experience. The committee would investigate these differences to determine possible reasons and would suggest improvements in data collection and analysis if necessary. It was felt that landings data from the province might provide a useful comparison. Bruce volunteered to check on the source of the province's data and where summaries could be obtained.

It was decided that in June the committee would receive a summary of the mandatory logbooks as indicated above, a summary of the soft-shell project, and a summary of the FSRS recruitment trap data to date. These would be data summaries and would likely not include analyses of trends. These analyses would not be available until October.

It was decided that the RAP meeting would be held in Yarmouth to facilitate attendance by invited fishermen representatives.

**2. Soft-Shell Project**

A summary of the soft-shell data and summaries available to date were presented. These are attached to the minutes. In general inside areas exhibited an increase in average protein levels from pre-season to in-season samples, while outside areas either showed a decline in protein levels or no change. These results are very preliminary and the generalizations should be used with caution. A more thorough examination will be presented at the FSRS annual meeting and the LFA 34 Advisory Committee meeting.

Ross reported on meetings with DFO science and nutritionists from the PEI Vet College and DFO. The result of these meetings was that there was not currently available a simple biochemical test for lobster nutritional state. These meetings also indicated that measuring blood protein and molt stage simultaneously as has been done was the best measure of lobster nutritional status available at this time.

All members supported the importance of completing the annual cycle of measurements and continuing this project in the future.

**3. Funding for Science**

Industry funding for science is essential for continuing the soft-shell work and initiating other science projects in LFA 34. Bruce Osborne volunteered to canvas port representatives for ideas on how to raise funds for science. It was pointed out that some ideas that have been put forth in other areas might not work in LFA 34. For example, and auction of traps was not likely to be supported by the MFU. Others felt that a charge could be levied for extra traps. There was some discussion about the ability and ways that provincial and federal governments could collect funds for science. One way might be to create a license for science, some felt that these would lead to licenses for other necessary jobs such as enforcement.

**4. Ad hoc Lobster Action Committee**

It was decided that the LFA 33 and LFA 34 science committees would serve as the basis for the continuation of the ad hoc lobster action committee that was set up and co-chaired by Ashton Spinney and Denny Morrow. The LFA science committees would determine when a meeting of the lobster action committee was necessary. Denny and Ashton would continue as chairs, but administration, such as taking minutes, distribution of minutes, and notification of the meetings would be done by the Yarmouth DFO area office.

**5. Additional Members**

It was noted that Jean Lavallée from the Vet college was not in attendance. Jean's name may have been inadvertently left off the distribution list and it would be added. In addition, Craig Prouty, LFA 34 fishermen, was not on the call. We will check to make sure he is on the list. Notes of the meeting should go to these individuals.

Note from the chair : There have been five meetings of the Science Committee leading to this RAP. Minutes from these meetings are reproduced here because they are an integral part of the evolution of the DFO-industry partnership with regards to lobster population evaluation in LFA 34.

**Meeting of June 14, 2005**
Boardroom Yarmouth DFO
1:00 – 5:00

**Attendees:**

| Participant | Affiliation | Participant | Affiliation |
|---|---|---|---|
| Natasha Doyle | UPEI Lobster Centre | Wayne Spinney | Fisherman |
| Jean Lavalleé | UPEI Lobster Centre | Kevin Ross | Fisherman |
| Doug Pezzack | DFO | Craig Purdy | Fisherman |
| Lei Harris | DFO | Denny Morrow | NS Fishpackers |
| Cheryl Frail | DFO | Ashton Spinney | Fisherman |
| Bruce Osborne | Province NS | John Tremblay | DFO |
| Jim Jamieson | DFO | Ross Claytor | DFO |
| Jennifer LeBlanc | FSRS | Anne Sweeney | DFO |
| Carl MacDonald | FSRS | | |

The draft meeting agenda is given below:

1) Review Minutes Feb. 14, 2005 (attached)
2) Review of fishery.
3) Terms of reference (Remit for RAP, see draft attached, Date for RAP)
4) Rap data review
    i) Logbooks
    ii) Sea samples, FSRS
    iii) List of potential data sources and indicators
5) Data to be presented at next meeting
6) Guidelines for presentation of data
7) Extension evaluation
8) Soft shell update
    i) Mail out results
    ii) Sampling plan 2005
9) Proposed research for 2005
10) Other
11) Next meeting date

**1) Review Minutes Feb. 14, 2005 (attached)**
Minutes were accepted.

**2) Review of Fishery**

**Fishermen**

*Fishermen St. Mary's Bay:*

Large amounts of rock crab were observed in St. Mary's Bay. Where rock crab were abundant, lobsters were scarce in traps. The extension had no value in St. Mary's Bay. There were lots of tinkers, more than the last 4 – 5 years. Lobsters were of excellent quality. Large lobster were about 10% higher than normal. 60 -90 scallopers in St. Mary's Bay did not stay.

*Cape Sable:*

Lobsters were down in Cape Sable in this year compared to last year. Lobsters in southwest grounds last year were average . In areas with scallop dragging where 2500 - 4000 pounds were caught in year previous to 2002, only 500 pounds were caught in 2002. Where there was scallop dragging there were more complaints about culls. However, there are concentration of culls where no scalloping occurs. Lobsters seemed to be moving closer to the LFA 33 line. There were many culls. Tinkers were abundant, especially the last couple of weeks of the season. There were not many large lobsters. Not many large lobster were seen during the extension. Increased culls seemed to be related to areas of scallop dragging. Hit and miss fall. More concentrating of boats in specific areas on the grounds. Fleet is targeting larger lobster and moving into deeper waters in winter.

*Tusket to German Bank Area:*

German Bank to inshore west of Tusket, the first day was excellent and the second haul was better than the first. Best fall equal to four years ago, but with extra pressure only average. Spring fishing was more inshore. It is possible to target larger lobster depending on bait. About 30% were jumbos, usually in deeper water 25 – 50 fathoms. They were mixed in with other sizes because of weather. Protein 9 – 9.5 during fall, west of the islands. Tusket basin was decent but there were few boats inside during the fall. Spring was not as good as it used to be. Don't see many scallops in traps anymore. Dramatic drop in lobster catches after first year of scallop fishery. Areas where scallop fishery occurred are avoided now. Lots of tinkers.

*Lobster Bay and Outside:*

Some traditional areas 40+ years of fishing not lobster in usually good areas. Outside grounds good quality lobster. West side and north there were better quality lobster. Recruitment excellent in spring if bait for it. Large male jonah and rock crabs were noticeable. 8 – 10 small lobsters in traps and many tinkers in general. Large lobsters in the spring were numerous. Knowledge of how to fish for large lobster is getting out to fishermen. Mud ground is being fished for large lobster. Area B and the closed triangle are being fished on the edge. The health of the stocks is exciting to see. Traditional bait herring and mackerel gets small lobster. 2 – 3 pound lobster were not as numerous as other years.

**Buyers and Processors:**

Quality in December in 34 was better and industry was better prepared to soft and low quality lobsters. Blood protein 8 – 9 went to processing plants. In LFA 33 it was the best quality in years. In LFA 34, 20 – 30 % did not go to live shipping and this was a big improvement over last year. Lobster in general were better than in 2003 in LFA 34. Quality was still not as good as in the 1990's. The industry was better prepared and this helped the situation. LFA 34, distribution of fishery with smaller boats inside made for more effort. In LFA 34 and Shelburne Co. 25 – 30% of the catch was jumbo lobster late in the season. Larger traps inshore with larger openings. Market is not good for them. Need a proper tally on landings. Fleet is more more mobile and more efficient, those fishing in 100 fathoms and on edge found more soft lobster. Exploitation rate on 2 pound and under lobster higher than expected early in the season. Later there were tinkers and large lobster. Because of changes in boats

there is more fishing on days when boats would have stayed ashore because of weather. Illegal traps left in water after season.

Separate populations midshore and different quality than inshore. Lobster are tested in lots upon arrival and separated on shore. Shift in effort ot inshore to offshore was similar to previous years. Large lobster in spring catch, jumbos inshore that have not been seen before (6 – 10%). Not as many chicks and ¼'s. Large lobsters are being targeted. Offshore catches are stable in distribution. 6 pounds and over are left in water. Protein in offshore similar to midshore. Soft lobsters not brought in. Change in fishing pattern, older boats are replaced by newer boats with high debt and are more mobile. Quality was bad in places this fall and Arichat was closed in the winter.

*Summary:*

Recruitment high everywhere. Rock crab high in St. Mary's and inshore in Lobster Bay. Lobster in general were better than in 2003 in LFA 34. Quality was still not as good as in the 1990's. The industry was better prepared and this helped the situation. Deeper that 70 fathoms poorer quality lobster. Large lobster were a higher proportion of the landings in spring.

**3) Terms of reference (Remit for RAP)**

**DRAFT REMIT**

Meeting of the Maritimes Regional Advisory Process Lobster in LFA 34
Jan or Feb ?, 2006 (to be discussed)

**Background**

LFA 34 is the largest LFA in Canada with landings exceeding 18,000t. It lies on the eastern side of the Gulf of Maine which also includes lobster fisheries in the Bay of Fundy (LFA 35-38), Canadian offshore (LFA 41) and the large USA fisheries of Maine, New Hampshire, Massachusetts and offshore.

The status of the lobster resources in LFA 34 was last assessed in 2001. The fishery presently operates under the 2001-2004 Conservation Harvesting Plan, which needs to be reviewed and updated.

**Objectives**

- Evaluate 2004 stock status of lobster stocks in LFA 34
- Recommend indicators for monitoring the future health of lobster stock.

**Products**

1. One Stock Status Report for LFA 34
2. Proceedings recording the minutes of the meeting
3. Research documents containing the technical details of the assessments

**Participation**

DFO scientists
DFO fishery managers
Industry
Non - DFO reviewers
Provincial advisors
First Nations

The remit was accepted and we decided to meet between Feb. 1 – 15 in Yarmouth.

**4) Rap data review**

*i) Logbooks*

Logbook reporting by 10 minute grid came into effect in 1998 and a summary of the data was presented. Data editing issues are that sometimes invalid grids or grids that do not exist are reported. About 10% of the reports do not indicate a grid. Error sources are recording, typos. Science and industry can contribute to the education of fishermen regarding the importance of these data.

A set of rules for finding invalid grids was discussed. It was decided that this was not generally possible as the fleet was so mobile that any distant movements of traps from one day to the next were possible.

In general the pattern of fishing depicted by the grid reporting reflected the reality of the fishery. For example, fishermen agreed that effort shifted further from shore. This was most obvious in the winter. Also there did not seem to be big changes in spring distrubtion.

An accurate accounting of total landings is required. We need to determine how this can best be achieved. This could serve as a check on logbook reports.

**ACTION:**

a) Percentage reporting is required to evaluate compliance.
b) Review data for CPUE (When are data with few trap-hauls to be considered as outliers, what is the definition of few)
c) Show details of scaling.
d) Loran bearings would improve reporting in logbooks.
e) Accurate and timely accounting of overall landings is needed.

*ii) Sea samples, FSRS*

These results will be presented at future meetings.

*iii) List of potential data sources and indicators*

Indicated at last meeting.

**5) Data to be presented at next meeting**

FSRS data.

Sea sampling data.

Explanation of exploitation rate method.

**6) Guidelines for presentation of data**

This related to confidentiality issues and it was decided that the manner and detail presented today was ok.

**7) Extension evaluation**

Extension evaluation will follow the procedures indicated.

**8) Soft shell update**

*i) Mail out results*

*ii) Sampling plan 2005*

To be presented at Advisory Committee meeting the following day.

**9) Proposed research for 2005**

None presented at this time.

**10) Other**

***Lobster Science Centre (UPEI)***

The Lobster Science Centre demonstrated how they would make summaries of the soft-shell project results to the public via their web site. It was felt that this site should be available to everyone and not restricted. Reporting the data in a timely manner is important. The percentage of lobster at various protein levels is something that would be useful.

***Cusk***

Lei Harris from DFO – St. Andrews presented a research proposal to estimate Cusk by-catch in the LFA 34 lobster fishery. The purpose is to estimate catch and survival. Cusk has been assessed by COSEWIC. If it is listed as threatened then Allowable Harm Permits must be issued. A recovery plan is developed that determines what activities are allowed under these permits. The proposed work will not affect listing but will influence the recovery plan.

**ACTION:**

i) **Use FSRS community techs to collect data.**
ii) **Consult with industry on sampling design to ensure biases do not occur.**

***Lobster Action Committee:***

It was decided that a meeting of Lobster Action Committee is needed. Items for the agenda of this committee are to be determined but would include research funding mechanisms. The

Province will handle the notice of the meeting, Denny and Ashton will develop an agenda, and J. Leblanc from FSRS can record the minutes.

**11) Next meeting date**

Sept. 15, 10:00 am – 4:00 pm, Yarmouth Area offce.

**Meeting of September 15, 2005**
Boardroom Yarmouth DFO
10:00 – 4:00

**Attendees:**

| Participant | Affiliation | Participant | Affiliation |
|---|---|---|---|
| Natasha Doyle | UPEI Lobster Centre | Kevin Ross | Fisherman |
| Barry Stahlbaum | UPEI Lobster Centre | Denny Morrow | NS Fishpackers |
| Doug Pezzack | DFO | Ashton Spinney | Fisherman |
| Cheryl Frail | DFO | John Tremblay | DFO |
| Bruce Osborne | Province NS | Ross Claytor | DFO |
| Jennifer LeBlanc | FSRS | Anne Sweeney | DFO |
| Carl MacDonald | FSRS | Jane Silver | Clearwater |
| Trent Shaw | Fisherman | | |

The meeting agenda is given below:

1. Notes from last meeting
2. Lobster Net presentation
3. Remit and candidate indicators for LFA 34 - Doug Pezzack
4. Revisit of data from logbooks - Cheryl Frail
5. Available at sea sample data and example indicator - Cheryl
6. Available FSRS data and example indicator - Carl MacDonald
7. Exploitation rate method - Ross Claytor
8. Update on cusk sampling - Carl and others
9. Report on underwater video in Lobster Bay - John Tremblay
10. Update on Lobster Management Board
11. Other

**1) Notes from last meeting**

A number of edits from the notes for the June 14, 2005 meeting were required. these are incorporated below. They should be examined again to make sure they reflect our discussion. Concerns were expressed that there is no directed study of the effects of scalloping on lobster. A good first step would be to compare landings before and after.

**2) Lobster Net presentation**

Natasha Doyle presented an update on the use of Lobster Net the UPEI web site to present and summarize the lobster quality research project results. Suggestions for improvements were to develop a Glossary of terms and an explanation for how calculations are made. Natasha would like to set up a steering committee to act as trial users of the web site. Ross

provides data to UPEI. Currently about a 4 month lag in collection to supply, as data is entered and then must be checked.

**ACTION:**

Steering committee to be set-up through the Lobster Action Committee. Jean Lavalleé will make contacts.

**3) Remit and candidate indicators for LFA 34 - Doug Pezzack**

We reviewed the remit and accepted it as is. We set the meeting for Feb. 1 – 2, Yarmouth. Doug Pezzack made a presentation discussing the categories of indicators and the data sources for each indicator.

The four categories are:

1. Abundance (Trends)
2. Removals
3. Production / Recruitment
4. Ecosystem/ Environment

*Abundance:*

The objective is to describe relative trends in abundance rather than estimate absolute abundance.

*Removals:*

This category describes fishing pressure.

Removals means catch, legal and non-legal. We discussed whether or not any data from enforcement activities would provide an index of non-legal removals. We decided that numbers of charges or patrols might be useful but that it would be difficult to interpret these with respect to removals because of changes in numbers of patrols and other factors that influence charges that cannot be tracked. We discussed whether or not calls to 'dial a poacher' could be used. These are not tracked.

Size distribution data relates to exploitation rate and is the basis for Length cohort analysis method for estimating exploitation rate. It was indicated that gear and bait influence the size of lobster caught.

Improved efficiency is adding fishing pressure. Some ways to quantify these changes are to:

1. Trends in days fished (logbooks)
2. Trends in trap-hauls
3. Trends in vessel size (there did not seem to be a good source of data for this)
4. Trends in number of grids fished (increased mobility, captured in logbooks)

*Production / Recruitment*

Recruitment means new animals. In our case we are referring to fishery recruits, rather than newly hatched or settled animals.

*Ecosystem / Environment*

This includes environmental effects on eggs and future production, as well as health and quality of lobster. It also includes factors that affect our interpretation of other indicators, particularly those influenced by catchability changes with respect to the environment. Other species are included in this category.

*Types of Data:*

Landings 1890-2004
Landings available by statistical district and port (1947-2004)
Landings from logbooks (1998-2004)
Landings relate to the abundance and removal indicators.

*Strengths and Weaknesses Landings.*

a) Strengths:
   i) Long view of the resource.
   ii) Grid landings spatial description of effort
b) Weaknesses:
   i) Concern for completeness and accuracy.
   ii) Illegal activity
   iii) No effort for long-time series.

*Abundance Ideas:*

Use sea sample data to ground truth grid data.

Consistent participants: Can we obtain a set of logbooks that we know are reliable?

How do we pick them?

1) Levels of confidence:
   a) All
   b) Those participating in sea-samples
   c) Those participating in FSRS

*At Sea samples*

At sea samples come from DFO sea sampling and FSRS recruitment traps. These will be used as abundance, removal, and production/ recruitment indicators.

*Sea samples: Strengths and weaknesses (abundance, exploitation rate, productivity)*

1) Strengths:
   a) Large sample size
   b) Time series back to 1981.
   c) Broad spatial coverage, especially in 1999 – 2000.
2) Weaknesses:
   a) No locations prior to 1988 (only general ports).
   b) Coverage varied
   c) Snapshot for the day.

d) Few in deep water.
e) Gear will influence size.
f) Weather influences catch rate.
g) Changes in effort not incorporated.

We will focus in 1998 – 2004 for these data.

*FSRS recruitment trap samples: Strengths and weaknesses (abundance, exploitation rate, productivity)*

1) Strengths:
   a) Trap design does not influence analysis of trends because traps are standardized.
   b) Fished each day
2) Weaknesses:
   a) Few in deep water.
   b) Some are moved from designated site.
   c) Selectivity of trap influences sizes caught.

We will make a distinction in the analysis between coastal and offshore traps where applicable. We will be careful of sample sizes when interpretations with respect to large animals are made.

Bait is recorded, we may be able to examine its influence in some cases.

*Sea sampling and FSRS traps may be used to estimate:*

Exploitation rate (change in ratio, changes in % mature, length cohort analysis (LCA) and percent berried given the strengths and weaknesses defined above.

These data may be used to define catch rates calibrated to some point in the season as was done for LFA 27. This was not pursued beyond a suggestion.

Some influences on size-structure may be occurring because 5+ animals are being targeted. **Action**: Clearwater may have some historical data that would be useful in this context. John Garland to be contacted by Doug.

*Trawl survey data: Strengths and weaknesses (abundance trends)*

1) Strengths:
   a) US data is a long-time series.
   b) Wide distribution
   c) Not a trap so is independent of bait.
   d) Not tied to commercial season.
2) Weaknesses:
   a) All deep water
   b) Low Canadian coverage, some outside German bank.
   c) Only certain bottom type is covered.
   d) Selectivity unknown (consistent over years?)

*Fishermen's information: Strengths and weaknesses (abundance trends, removals, productivity)*

1) Strengths:
   a) Long-term
   b) Wide spatial coverage
2) Weaknesses:
   a) Bias in industry to protect income.
   b) Difficult to quantify.

Previously collected voluntary logbooks may be helpful for an historical perspective.

**ACTION:**

For the future it would be worthwhile investigating methods to obtain access to individual fishermen's and processor's data. Steps would be to determine what exists, is it useful, and how to obtain it

*Oceanographic and ecological data: strengths and weaknesses (ecosystem/ environment)*

1) Strengths:
   a) Long-time series
2) Weakness:
   a) Spotty spatial and temporal distribution

*Growth and Maturity data: strengths and weaknesses (ecosystem/ environment)*

1) Strengths:
   a) Biological reference point
2) Weakness:
   a) Assumed to be static

**4) Revisit of data from logbooks - Cheryl Frail**

Cheryl reviewed some examples of the data from logbooks. This presentation concentrated on landings and indicated a movement in Winter (Jan – March) of movement of catch towards the outside.

CPUE data was examined by removing data with zeros for catch or effort. These are considered to be typographical errors and should be removed from the data. Prior to this removal the data base contained about 14, 000 records and after removal about 12,000.
**Action**: Use data with obvious errors removed.

We discussed the division of LFA 34 into 11 sub-areas for data analysis. These consisted of areas stratified on the basis of depth, size of lobster, and fishing patterns. They consisted in general of inshore, midshore, and offshore areas within LFA 34.

**ACTION:**

It was decided to have a second look at the stratificatic These were devised to direct at-sea sampling and not data analysis. It was thought that the division may be too fine to obtain definite conclusions. Doug to re-examine sub-area designation

based on depth, size of lobster, and fishing pattern with a view to keep consistency amongst areas examined in the RAP.

A general discussion followed on some of the issues around the strengths and weaknesses of these data. Illegal landings were revisited.

**ACTION:**

Anne Sweeney to investigate and report on possibilities for getting an index of trends in this activity.

Efficiency of the fleet was re-visited.

**ACTION:**

Include an analysis of fishing days, trap-hauls, and movement to quantify efficiency trends in the fleet. There may be a possibility that getting information from boat suppliers may help in quantifying changes in boats. No one could see how this could be done easily or in time for the assessment.

The effect of price on fleet distribution was noted but we did not pursue how to measure this.

**5) Available at sea sample data and example indicator – Cheryl**

Cheryl presented a summary of the data collections which confirmed the comments above regarding strengths and weaknesses.

**6) Available FSRS data and example indicator - Carl MacDonald**

Carl presented a summary of the FSRS data. These confirmed the discussion above regarding strengths and weaknesses.

**ACTION:**

The temperature data collected during this project relates strongly to the ecosystem / environment indicators. We will ask Brian Petrie to come to our next meeting and present his analysis for LFA 34.

**7) Exploitation rate method - Ross Claytor**

Deferred to next meeting.

**8) Update on cusk sampling - Carl and others**

Carl updated the group on Lei Harris's plan for cusk sampling. She wants to collect 75 samples, 25 each from inshore, midshore, and offshore within LFA 34. FSRS is to do the sampling. She also wants to study survival. This is a difficult problem to investigate during the fishery. DFO will sample LFA 41.

**ACTION:**

Lei to come to next meeting and explain sampling design and discuss survival study.
Lei to phone fishermen attending to discuss survival study ahead of time.

**9) Report on underwater video in Lobster Bay - John Tremblay**

John presented a summary of his recent video survey in Lobster Bay. This is an approach the committee would like to see developed. Some of the comments included:

Good to have something you can see.

Not good enough once a year, how often would sampling occur?

How would it be expressed? (number of lobsters/ $m^2$)

Would have to incorporate depth as window of width observed changes with depth.

**10) Update on Lobster Management Board**

The management board is progressing but slowly, there are no developments that help immediately in obtaining funding for science.

**11) Other**

***(Guidelines for presentation of data)***

No objections to method of presentation with respect to confidentiality.

***(Approach to RAP)***

Everyone agreed we were headed in the right direction for these pre-RAP meetings. After the RAP we will have a better idea of what worked and what did not.

**12) Next meeting:**

To coincide with LFA 34 advisory committee and Lobster Action committee in mid-November.

**ACTION:**

Anne Sweeney to co-ordinate dates.

**November 16, 2005**
Boardroom Yarmouth DFO office
9:00 – 4:30

**Attendees:**

| Participant | Affiliation | Participant | Affiliation |
|---|---|---|---|
| Carl MacDonald | FSRS | Jamie Emberley | DFO |
| Jean Lavallée | UPEI Lobster Centre | Kevin Ross | Fisherman |
| Doug Pezzack | DFO | René Lavoie | DFO |
| Lei Harris | DFO | Denny Morrow | NS Fishpackers |
| Cheryl Frail | DFO | Ashton Spinney | Fisherman |
| Bruce Osborne | Province NS | John Tremblay | DFO |
| Jim Jamieson | DFO | Ross Claytor | DFO |
| Jennifer LeBlanc | FSRS | John Garland | Clearwater |

The draft meeting agenda is given below:

1. Notes from last meeting
2. RAP
   2.1. Who attends RAP
   2.2. Where in Yarmouth to hold RAP
   2.3. Where the minutes will appear
3. Actions from last meeting
   3.1. Update on cusk sampling
   3.2. Lobster Net update
   3.3. Clearwater historical data on size structure
   3.4. Sub-area designation review based on depth, size of lobster, and fishing pattern
   3.5. Include an analysis of fishing days, trap-hauls, and movement to quantify efficiency trends in the fleet
4. Lobster settlement update
5. Exploitation rate method
6. Catch rate analysis updates
7. Funding soft shell
8. Confidentiality
9. Next Meeting

**1. Notes from Last Meeting**

A few changes were made to the industry Review of the fishery from Feb. 14, 2005 meeting. 5+ in sea-sampling section should be 5". The ITQ survey should be added as a trawl survey source of data but indicate there is only one year of measurements. SFA 29 scallop survey is another survey source of data for lobster. There were no other changes.

**2. RAP**

*2.1 Who attends RAP*

**ACTION:**

We decided to invite: members of the Science Committee and Port reps. The Nova Scotia Fishpackers would be invited as a group and Denny can bring two members. Clearwater would be invited through SPANS. Jerry Amirault would be invited through the Maritime Lobster Processors Co-operative.

*2.2 Meeting procedure*

- Three science reviewers will be invited to the meeting. Industry members will be asked to make a recommendation on whether or not an Industry / Science reviewer would be designated and invited as such.

- René Lavoie as chair of the RAP will open the meeting with a description of the science committee process and explain that science reviewers will first be asked to comment, then science committee members, and then open to the floor. He will also indicate to those present that observers can take their concerns and questions to members of the science committee for presentation if they prefer. The invitation to the RAP will explain the meeting process.

- Working papers are to be made available to the science committee and reviewers one week ahead of the meeting.

- A questionnaire will be prepared that will determine people's opinion of the process.

**ACTION:**

René to draft letter of invitation. John Tremblay will contact potential reviewers. Ross Claytor will determine if the RAP office covers external reviewers.

*2.3 Where in Yarmouth to hold RAP*

The Grand Hotel was thought to be the only place large enough.

**ACTION:**

John Tremblay will contact the hotel.

*2.4 Where the minutes will appear*

**ACTION:**

- Denny will prepare a summary of the meetings that will appear in the SAR. There will be a bullet in the SAR summary on this process.
- A one page summary of the meeting process will be prepared that could accompany the SAR briefing note to inform Ottawa of the process.
- The minutes from the meetings will appear in the RAP proceedings.

**3. Actions from Last Meeting**

*3.1 Update on cusk sampling*

Lei Harris explained that a project is planned for this fishing season to estimate cusk by-catch in the lobster fishery and to estimate cusk mortality in lobster traps. She explained that the sampling to estimate by-catch would have about 40 samples in the midshore and offshore area and about 35 in the inshore area. The emphasis on the midshore and offshore is a result of previous year's sampling occurring in the inshore that can be used. Estimates of by-catch will be made by expanding the catch of cusk in the sampling by the amount of effort by area and portion of season. Error bars will be presented along with the estimates. FSRS technicians will conduct the sea sampling.

A number of methods estimating mortality were discussed. The method adopted was the one originally proposed by Lei, in that cusk caught in the lobster fishery will be measured and recorded and their condition noted. Those alive will be returned to the bottom in a lobster trap that will be part of the fisherman's trawl. Their condition the next time the trap is fished will be noted. Among the problems discussed was bias induced in mortality estimates by a quick trip to the bottom rather than allowing the cusk to make it to the bottom at their own speed and thereby equalize pressure more easily. The only alternative discussed was to conduct a tagging experiment that would focus some fishing trips on catch cusk for tagging. This was not considered possible given the length of time before the season. It was recognized that the estimates of mortality would likely be biased high but were a good first attempt.

It was also pointed out that this study will not influence whether or not cusk are listed.

**ACTION:**

Lei will carry out the sampling and mortality experiments as planned.

*3.2 Lobster Net update*

Lobster Net is the website run by the Lobster Centre at UPEI that will be used to provide data summaries associated with the lobster molt and quality project. Jean Lavalleé has created a steering committee to review the site and set the data access procedures. A glossary, objectives for the project, and several summary tables and graphs have been prepared. Natasha will be reviewing these changes at a steering committee meeting this evening.

*3.3 Clearwater historical data on size structure*

Doug Pezzack and John Garland presented a summary of the percentage of lobsters at a ranage of sizes from chix to 9 pounds from 15 boats in the Pubnico fishery. This summary indicated that the percentage of large lobsters was much greater in 2005 than in 2003 and 2004.

A key question John asked was what impact this change in percentage will have on the stock.

A number of questions of interpretation resulted from the presentation of these data.

How representative of the fishery are these data, if they are only from 15 fishermen from Pubnico?

How can percentages be interpreted? Is the percentage of large lobster up because small lobsters are down, or because these animals are being targeted?

It was pointed out that at the LFA 34 advisory meeting in June that several fishermen identified a concern that a portion of the fleet was targeting large lobsters.

Ashton pointed out that a few winters ago, a higher price per pound was being paid for large lobster.

These data apply to the removal category for the indicators.

Strengths of these data:

- They represent a large percentage of the catch from an area.
- Covers the whole season and not just a snapshot.
- They represent the complete catch of a group of individuals.
- Includes sex in sub-samples.

Weaknesses of these data:

- Limited location on data
- Interpretation depends on other data such as logs and temperature.

**ACTION:**

John will put together summaries for all areas, based on Doug's sub-areas (see below).

*3.4 Sub-area designation review based on depth, size of lobster, and fishing pattern*

Doug presented a map showing 7 sub-areas and this was accepted as a way of stratifying the fishery for analysis wherever it was possible.

*3.5 Include an analysis of fishing days, trap-hauls, and movement to quantify efficiency trends in the fleet*

Our hypothesis was that larger boats were making the fleet more efficient and that they were able to stay out in bad weather and to travel more searching for lobster. If this were true then we should see an increase in number of trap-hauls, days fished, and grids fished per fishermen. The logbook data did not show this. A possible reason was that the changes had occurred prior to the logbook data being initiated. We tried to think of other measurements that would be better able to detect these changes. Some suggestions included:

- Distance between grids
- Distance from shore
- Distribution of grids fished
- Distribution of fleet in grid

Ashton pointed out that the reason people are shifting or moving would be important. It is not always because catch rates have dropped but because key individuals have moved and are being followed.

**ACTION:**

Doug, John, Cheryl, and Ross will consider other metrics and perhaps bring these analyses to the next meeting.

**4. Lobster Settlement Update**

John Tremblay presented the results of a pilot study conducted this fall to determine the feasibility of suction sampling to estimate juvenile lobster abundance. An extensive network of sites has been sampled in New England for the past 10 – 15 years with one in New Brunswick. If a study in LFA 34 could be done it would add to the network of sites contributing to an understanding of the population dynamics of juvenile lobster. The annual cost would be 10 – 20K for up to three areas.

**5. Exploitation Rate Method**

Ross Claytor presented a methodology used to estimate exploitation rate in lobster fisheries based on a change-in-ratio technique. The method uses data collected in the FSRS recruitment traps and measures exploitation rate using the decline in the ratio of sub-legal to legal size lobster. Sub-legal lobster are 75 – 80 mm and legal size lobster are divided into three size categories: 81 – 90, 91- 100, and >100 mm carapace length. Each of these sizes is also divided into male and female groups. The main assumptions required for the analysis are provided below:

1. Population closed – movement, deaths, and births of the length-classes examined is similar
2. Three factors are constant
   2.1. Catchability between size-classes
   2.2. Catchability between monitoring traps and commercial traps
   2.3. Ratio of fleet and monitoring trap effort

The consequences of these assumptions are that the conclusions are most reliable using narrow adjacent length-classes.

The length-classes being compared caused some confusion and in future presentations it should be made clear which length-classes are being compared.

**ACTION:**

Ross will present the analysis with up to date data in the assessment, with additional explanation of the methodology.

**6. Catch Rate Analysis Updates**

Doug Pezzack presented a summary of the logbook data to ensure that all data, which was reasonable to edit or delete, has been accounted for. Catch rates over 30 lbs/ trap are suspect but some thought that these might be coming from those fishing more than 375 traps. The data set was accepted as sufficient for our analyses.

**ACTION:**

We will use these data as presented by Doug. If additional testing is required a comparison of catch rates in LFA 34 and LFA 41 along the 50-mile line could be made.

John Tremblay presented additional detail on catch rate summaries and presented a table for summarizing the results compared to trend lines. The table consists of sideways and up and down arrows to show trends for each indicator. This is similar to the table John presented for the LFA 27 assessment in Jan. 2004.

**ACTION:**

The group liked the arrow table as a way of summarizing the indicator trends.

**7. Funding Molt Stage and Lobster Quality**

Bruce Osborne summarized the funding situation for the molt stage and lobster quality project. Last year the money provided to FSRS by the province to support sampling came from left over money. There is no guarantee that this will happen again. Bruce is following up on two options. First, the Innovations fund which may provide at most about $10,000 and emphasizing the product development and marketing aspect of the project. The total budget to duplicate the sampling done this year, plus provide analytical support is about $70,000.

**ACTION:**

Ross Claytor and Jean Lavalleé are to revise and formalize the proposal.

**8. Confidentiality**

The group felt the presentation of the data as provided did not violate any confidentiality issues.

**9. Next Meeting**

The next meeting is scheduled for Jan. 12 in the Yarmouth office 9:00 – 4:00.

**January 12, 2006**
Boardroom Yarmouth DFO
9:00 – 4:30

**Attendees:**

| Participant | Affiliation | Participant | Affiliation |
|---|---|---|---|
| Carl MacDonald | FSRS | Trent Shaw | Fisherman |
| Jean Lavallée | UPEI Lobster Centre | Kevin Ross | Fisherman |
| Doug Pezzack | DFO | René Lavoie | DFO |
| Craig Prouty | Fisherman | Denny Morrow | NS Fishpackers |
| Cheryl Frail | DFO | Ashton Spinney | Fisherman |
| Bruce Osborne | Province NS | John Tremblay | DFO |
| André Cottreau | DFO | Ross Claytor | DFO |
| Wayne Spinney | Fisherman | John Garland | Clearwater |

The meeting agenda is given below:

1) Review of minutes
2) Industry reviewer at RAP meeting, conclusion
3) Summary table methodology
4) Abundance indicators
   a) Landings
   b) Catch rates
5) Fishing pressure indicators
   a) Effort
   b) Days fished
   c) Trap hauls
   d) Exploitation rate CIR
6) Production
   a) At sea samples
7) Any major discrepancies in these indicators from experience
8) Analysis to be completed
   a) Abundance
      i) Scallop survey data
      ii) FSRS data with temperature adjustment
   b) Exploitation rate
      i) Percent molt group
      ii) LCA
   c) Production
      i) FSRS catch rates
      ii) Berried females

d) Environment
9) Confidentiality
10) John Garland size structure

**1. Review of Minutes from Nov. 16**

The review of the minutes provided the following action items and clarifications.

*1.1 RAP meeting*

**ACTION:**

We decided to have a post-mortem on the RAP and scientific committee process during the week of Feb. 13. We would try to combine this with a scheduled LFA 34 Advisory Committee meeting expected for Feb. 15 and would try to meet either the day before or the day after. This post-mortem would be included in the package that results from the RAP which would include the briefing note based on the SAR bullets, Denny Morrow's description of the process, the post-mortem review, and the SAR. The minutes from our meetings including the post-mortem would go in the proceedings. We would try to include in the review concrete steps that could be taken in the evolution of this process.

*1.2 Lobster molt and quality project*

We identified the public availability of the lobster molt and quality project data on the Lobster Science LobsterNet website:

http://www.lobsterscience.ca/

This site is now available to the public and notices have been placed in the Sou'wester, FSRS newsletter, and Navigator.

This project was identified by one member as the most important question to understand and research, in the lobster fishery. Funding is required for this project to continue. Jean Lavallée indicated that if the project goes through the Lobster Science Centre then they are eligible for matching ACOA funds from other sources. A person is required who can be dedicated to the analysis, particularly with analyses that look at correlations with temperature. To make this into a predictive tool, requires several years of data, Clearwater may have historical data during the season that could help. John Garland indicated that temperature,molt stage, and blood protein levels before the season seem to be likely predictive candidates. The community college at Shelburne may be a source of students. We recognized that this is a problem that will require all portions of the fishery, universities, and government to be involved in solving.

**ACTION:**

Ross Claytor, Jean Lavallée, and Patty King are to complete a revised project for the next fiscal year and present this to the Lobster Action Committee.

**ACTION:**

Jean Lavallée to contact Catherine Vardy at NSERC (Natural Sciences and Engineering Reseach Council) to see if she can come to the next Lobster Action

Committee meeting and explain the NSERC industry collaborative programs. Ross to provide contact information.

**ACTION:**

Denny Morrow to contact Revenue Canada to see if they can come to the next meeting and explain the research tax initiatives. Ross to provide contact information.

**ACTION:**

John Garland to investigate whether Clearwater has data that would be useful for developing predictive models.

**ACTION:**

Review the current sampling protocols at the Lobster Action Committee meeting.

**2. Industry Reviewer at RAP Meeting - Conclusion**

Industry representatives decided not to identify an individual as a scientific reviewer at the RAP meeting. We would follow the usual RAP protocols., after the referees, members of the LFA Science Committee, DFO Fisheries Managers and industry representatives on the LFA 34 Advisory Committee will have the opportunity to ask questions and provide input.

**3. Summary Table Mthodology**

A summary table was proposed as a method for clearly presenting the results from each of the indicators presented for the assessment (see appendix 1 for draft discussed at meeting). After some experimentation we decided that a plus (+) sign would be used if 3 of the last five years indicated a beneficial trend compared to the mean of the years indicated for comparison. A negative (-) would be used if 3 of the last five years indicated a detrimental trend compared to the mean of the years indicated for comparison. A blank (b) would be used if the trend was neither beneficial or detrimental.

**4. Abundance Indicators (see Appendix 1, for results)**

For all these indicators values that are numerically higher than the averages for the comparison years are interpreted as being beneficial. Those lower are detrimental.

*4.1 Historical landings:*

We would indicate in the text of the working paper or perhaps a footnote in the table how the landings were compiled. A good method for calculating landings is required. Different years provide different subsets for comparison and different geographic areas that can be compared.

**ACTION:**

Doug to combine Stat district 38 with stat district 36.

*4.2 Catch rate from logbooks*

This was available for the entire season but will be presented by portion of the season for the assessement.

*4.3 Catch rate (logs, model)*

This method for estimating catch rates uses the same data as in 4.2, but applies a statistical model to achieve an estimate of catch rates that includes the variation or uncertainty in the estimate. To achieve this it uses information from each fishermen's fishing pattern, information from each grid area, and each fishing day separately. The variation from each of these effects is separated from the annual variation. Finally the annual variation with uncertainty is reported. In order to do this, the model makes the following assumptions:

A fishermen is either always above or below average in a given area. We recognized that while this was generally true, there were exceptions but overall it is unlikely that this would occur often enough to bias the model results. An improvement in the model could be achieved by incorporating temperature but this is unlikely to be achieved in time for the RAP.

*4.4 Catch rate (FSRS, model)*

A similar analysis could be accomplished using the FSRS data but would not be able to incorporate individual fishermen effects or all grids because of low sample sizes.

*4.5 U.S. trawl survey*

The US trawl survey for the most part lies outside the LFA 34 area. Thus, we decided not to include these data in the summary table but to write text to indicate the trends observed and its relevance to the LFA 34 assessment.

**5. Fishing Pressure Indicators (see Appendix 1)**

For all these indicators values that are numerically higher than the averages for the comparison years are interpreted as being detrimental, (i.e. more effort has been applied to the population). Those lower are beneficial (less effort on the population).

*5.1 Number of days fished / fishermen*

The number of days fished / fishermen was estimated to examine if larger boat sizes has lead to an increased number of days fishing. This would measure an increase in boat capability in the fishery. This would be estimated for all grid areas combined. An increase. For some areas an increase in the number of fishing days is not viewed by fishermen as an increase in effort. They felt there were geographic areas of the fishery where fishing more days just lead to the capture of lobsters that would have been caught anyway, if the traps had been left in the water for more soak days. In most, areas the interpretation given above would apply. These data are available only since 1998 when the more detailed logbooks came into effect.

*5.2 Number of grids fished / fishermen*

Increased mobility of the fleet was measured by estimating the number of grids fished / fishermen. Increased mobility indicates increased pressure on the population, a detrimental effect. These data are available only since 1998 when the more detailed logbooks came into effect.

*5.3 Number of trap hauls*

Number of trap hauls was estimated by grid area from the raw logbook data. These data are available only since 1998 when the more detailed logbooks came into effect.

*5.4 Exploitation rate*

Several methods of estimating will be looked at in the assessment but only the change-in-ratio method was presented at this meeting. This method uses the change in the ration of legal (removed lobster) to sub-legal (non-removed) lobster to estimate exploitation rate. Two kinds of estimates are obtained, one that estimates exploitation rate for the harvestable portion of the fishery, only those above legal size (strict) and one that estimates the exploitation rate on a standard size group within the population to measure the effect of size increase in reducing exploitation rate (extended).

**6. Production**

For all these indicators values that are numerically higher than the averages for the comparison years are interpreted as being beneficial. Those lower are detrimental.

*6.1 At-sea-samples were examined to obtain estimates of recruitment.*

**ACTION**:

The size groups examined need to be standardized so that all years are comparable, we chose to look at 71 – 80 mm group for standardization. The x-axis must have the same years for comparison. We decided to make 1990 the cut-off for consistency among sampling areas, but could show all years of data in the graphs.

6.2 FSRS data will also be available for these analyses and we will try to apply the same statistical model to these data in order to obtain estimates of uncertainty around the estimates.

6.3 A large gap in the analysis was that the indices for berried females were inadequate because of low sample sizes.

**ACTION**:

Carl MacDonald to supply a special berried female measuring gauge to Trent Shaw to count and measure berried females for the rest of the season. Trent made the suggestion that this could be a simple way for fishermen to provide data for a berried female index.

**ACTION**:

We will also address this and any other gaps that arise from the RAP process at our post-mortem with the view to making concrete project proposals.

**7. Any major discrepancies in these indicators from experience**

No major discrepancies between the indicators and fishermen attending were noted.

## 8. Analyses to be completed

*8.1 Abundance*

Analyses to be completed include the scallop survey and FSRS data with temperature adjustment if possible.

*8.2 Exploitation rate*

Will include first molt group, Length cohort analysis, and one other statistical based method (Gould-Pollock) if possible.

*8.3 Production*

FSRS data raw and model if possible for sub-legals and berried females.

*8.4 Environment*

Brian Petrie will present environmental data at the RAP. His presentation may require an extension to the summary table to include portion of the season and depth categories. We will likely have to report these trends as above or below average as interpretation as beneficial or detrimental will depend on context of other indicators.

## 9. Confidentiality

Confidentiality guidelines were not violated.

## 10. John Garland size structure

John's data would still be useful.

## 11. Next meeting

Week of Feb. 13 in combination with LFA 34 Advisory Committee.

**Appendix 8.** Draft example of Indicator Tables.

Positive (+) if 3 of last 5 fishing seasons (2000-01, 2001-02, 2002-03, 2003-03, 2004-05) improved relative to reference period (1998-1999 & 1999-2000)

Negative (-) if 3 of last 5 years weakened relative to reference period

Abundance - Legal sizes: Landings

| **Indicator** | **SD or port groups** | | | | | |
|---|---|---|---|---|---|---|
| | 32 | 33 | 34 | 36 37 | 38 | ALL |
| Historical Landings – All of LFA 34 (1890-present) | | | | | | |
| Last 5 seasons vs vs 10 yr mean | Not available | | | | | + |
| Last 5 seasons vs 50 yr mean | | | | | | + |
| | | | | | | |
| Historical landings – Stat Districts or ports (~1985-present) | | | | | | |
| Last 5 seasons vs 10 yr mean | + | + | + | + | + | |
| Last 5 seasons vs 20? yr mean | + | + | + | + | + | |

Note: Stat Dist 36 to be combined with 37.

Abundance - Legal sizes: Spatially referenced catch and effort.

Unless otherwise indicated, Comparison is between last 5 seasons (2000-01, 2001-02, 2002-03,2003-04,2004-05) & "baseline seasons" (2 previous seasons of 1998-99 and 1999-00). Blank, no change is a b.

| | 1 | 2.2 | 2.2 | 3 | 4.1 | 4.2 | 5 | 6 | 7 | ALL |
|---|---|---|---|---|---|---|---|---|---|---|
| Landings Fall | | | | | | | | | | |
| Winter | | | | | | | | | | |
| Spring | | | | | | | | | | |
| Total | + | - | + | + | + | + | + | + | + | |
| Catch rate (logs, raw) Fall | | | | | | | | | | |
| Winter | | | | | | | | | | |
| Spring | | | | | | | | | | |
| Total | + | + | + | + | + | | + | + | ? | |
| Catch rate (logs, model) Fall | + | + | + | + | + | + | + | + | + | |
| Winter | | | | | | | | | | |
| Spring | - | ? | + | - | ? | + | b | b | b | |
| | | | | | | | | | | |
| Catch rate (FSRS, model) Fall | | | | | | | | | | |
| Winter | | | | | | | | | | |
| Spring | | | | | | | | | | |
| | | | | | | | | | | |
| US Trawl survey | | | | | | | | | | |
| | | | | | | | | | | |
| Scallop survey | | | | | | | | | | |
| | | | | | | | | | | |
| Gould-Pollock? | | | | | | | | | | |

Fishing pressure–

Unless otherwise indicated, Comparison is between last 5 seasons (2000-01, 2001-02, 2002-03,2003-04,2004-05) & "baseline seasons" (2 previous seasons of 1998-99 and 1999-00). A negative indicates a detrimental effect because it is an increase in effort. A positive indicates a beneficial effect because it is a decrease in effort.

| | 1 | 2a | 2b | 3 | 4a | 4b | 5 | 6 | 7 | ALL |
|---|---|---|---|---|---|---|---|---|---|---|
| Fishing effort | | | | | | | | | | |
| | | | | | | | | | | |
| Mobility No. of days fished/ fishermen | Not relevant | | | | | | | | | - |
| Mobility No. of grids fished/fishermen | | | | | | | | | | + |
| No. of trap hauls estimate 1 | | | | | | | | | | |
| Nol of trap hauls estimate 2 | | | | | | | | | | |
| | | | | | | | | | | |
| Exploitation rate | | | | | | | | | | |
| Extended (75-90) | | + | | | | | | | | |
| Strict (MLS-90) | | b | | | | | | | | |
| Strict (91-100) | | b | | | | | | | | |
| Strict (>100) | | b | | | | | | | | |
| | | | | | | | | | | |
| % in molt group 1 | | | | | | | | | | |
| | | | | | | | | | | |
| LCA | | | | | | | | | | |
| | | | | | | | | | | |
| Change-in-ratio | | | | | | | | | | |
| | | | | | | | | | | |
| Gould-Pollock? | | | | | | | | | | |
| | | | | | | | | | | |

Production/Recruitment – Pre-recruit sizes and Spawners

Unless otherwise indicated, Comparison is between last 5 seasons (2000-01, 2001-02, 2002-03,2003-04,2004-05) & "baseline seasons" (2 previous seasons of 1998-99 and 1999-00).

| | 1 | 2a | 2b | 3 | 4a | 4b | 5 | 6 | 7 | ALL |
|---|---|---|---|---|---|---|---|---|---|---|
| Catch rate from at-sea samples? | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Catch rate from FSRS traps | | | | | | | | | | |
| | | | | | | | | | | |
| 51-60 | | | | | | | | | | |
| 61-70 | | | | | | | | | | |
| 71-mls | | | | | | | | | | |
| All sublegal sizes | | | | | | | | | | |
| | | | | | | | | | | |
| Ovigerous females | | | | | | | | | | |
| < mls | | | | | | | | | | |
| Mls to 100 mm CL | | | | | | | | | | |
| > 100 mm CL | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

Ecosystem/ Environment

| | 1 | 2a | 2b | 3 | 4a | 4b | 5 | 6 | 7 | ALL |
|---|---|---|---|---|---|---|---|---|---|---|
| Temperature | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Other? | | | | | | | | | | |

**Appendix 9**. Article for DFO Magazine "Oceans".

Title : *A First for Maritime Lobster Science*

A very unique lobster science meeting was held in Yarmouth, NS, on February 1-2, 2006. The groundbreaking event was the Regional Advisory Process (RAP) for Lobster Fishing Area (LFA) 34, which is located in South West Nova Scotia. LFA 34 is the most productive in the Maritimes; its lobster population supports the most valuable fishery in Atlantic Canada.

The unique feature of this RAP was an unprecedented level of industry participation. DFO Science followed up on an industry offer made at an earlier lobster RAP and formed a Science Committee to exchange information with industry and obtain feedback about on-going research.

The Science Committee consisted of representatives from industry (fishermen, buyers and processors), the province, the Lobster Science Centre, Fisheries and Aquaculture Management and the Science Branch. Five meetings were held in preparation for this RAP : January, June, September, November 2005 and January 2006. I attended the November 2005 and January 2006 meetings and was impressed by the openness of the discussions and the level of information exchanged.

Industry contributed on several fronts. Fishermen validated the all-important fishery data contained in logbooks, and endorsed the scientific analysis of it. They brought attention to important changes in the fishery like increased fishing pressure resulting from an increase in boat size and the targeting of larger lobsters which, in turn, may impact the reproductive capacity of the population. Fishermen also raised valid questions about assumptions made in some models used to estimate exploitation rates.

The 2006 LFA 34 RAP produced an assessment of the current statutes of the population and made recommendations on an improved assessment framework for the future. These recommendations on data sources, and indicators of lobster abundance, fishing pressure, production and ecosystem will have a profound effect on future population evaluations.

This RAP, and the manner in which it was prepared and conducted, improved the credibility of DFO Science, and the ability of scientists to obtain industry's cooperation. The industry, for its part, valued its increased role in the preparation for this RAP and expressed its wishes to play an even larger role in the future.

## Appendix 10. LFA 34 Science Committee Members

From left to right the members are:
Jean Lavallee; Jim Jamieson; Wayne Spinney; Craig Prouty; Anne Sweeney; Cheryl Frail; John Tremblay; Ashton Spinney; Ross Claytor; Carl MacDonald; Doug Pezzack; Ian Marshall; Jennifer LeBlanc; and Denny Morrow